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THE ATLANTIC OCEAN

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THE ATLANTIC OCEAN

Bridge Between Two Worlds

F. GEORGE KAY

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INTRODUCTION

YEARS ago, when a relative took me to watch the breakers of a Westerly gale smash themselves on the Lizard, I enquired what made the waves and from where did they come. The answer was that "the wind made them and they came from another world—the New World—from a country called Newfoundland". That in these words was truth did not impress so much as the awesome significance of distance, of a place so remote that it bore no relation, except in name, to the land I knew and the world in which I was born.

Time has not minimized that feeling. Those bounding grey-green waves sweeping in impotent fury against Cornwall led me through the years to a lifetime of interest. Sometimes—and too rarely—came travel to glimpse some of the beauty, the fear, the harshness, and the joy the Atlantic can bring. Sometimes—and still too rarely—the immense record of others who have succumbed to the behests of Oceanus and his daughter Tethys provided the magic boat in which to sail through this sea and backwards in time.

In these pages I have tried to set down the story of the Atlantic as I know it. An ocean so immense, so important in the life of Western civilization, is not within the bounds of description in one book or by one author. But perhaps these pages will provide an aperitif to a banquet of fascinating and thrilling material, both in print and in geographical fact.

So far as possible, nautical terms have been kept to those which are familiar to everybody, and to simplify the mental picture of the areas described the modern name is normally used—thus landfalls made by early explorers are identified by the names given years and even centuries later.

Finally, a word of thanks to those many officials of both commercial and state organizations who have patiently and generously aided my researches with valuable advice and most useful material.

F. GEORGE KAY.

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CHAPTER I

BIRTH OF AN OCEAN

"And God said, Let the waters under the heaven be gathered together unto one place. . . ."

The place stretched from the present position of the Andes to the Himalayas; the waters formed the Sea of Tethys. And the time was between 1,600 and 3,000 million years ago. The date is vague, the period meaningless. But the waters of Tethys, vapourized, frozen, hurled ceaselessly from heaven to earth and earth to heaven, are still much the same in constitution and appearance as they were at the birth of the world. They are the waters of the Atlantic, changing but changeless, thirty-one and a half million square miles of them, which at this moment of human life caress and rage on shores which are meticulously exact on a map, and to-morrow will change in the ceaseless war between land and water, contorting and writhing as old lands slither into oblivion and new lands emerge.

The Atlantic is old, by most accounts the oldest of our seas. The foundations of its deeps have never been above water in earth-time. They spurned the cascading storms with their white-hot rock and sent them whirling upwards in invisible steam for incalculable aeons. But the water conquered, as water always will. As the skin of the globe cooled the waters settled in the depths to hide it for all time, blanketed by ooze from the probing grapnel, too deep for the sinking bathysphere, too dark for the dangling underwater camera.

On the merest upper skin of this primordial ocean man sails in confidence of his powers. His ships carve a hair-line on the surface, and seamen who have gazed along the tiny arc which is their horizon while they make another crossing boast that they know the Atlantic well. . . .

In the bosom of the Atlantic and among the rocks of the lands which border it lies the ultimate secret of earth's history. While theories differ violently about the facts which lie behind the simple but impressively truthful statement of Genesis, most agree that there was once one large ocean, the combination of innumerable pools, lakes and seas. The gathering together of the waters unto one place was remorseless, slow, interrupted by cataclysm, changed by ages of great cold and great heat. The rain fell unceasingly for century after century, the clouds whirled by winds which would make the tornadoes of to-day seem like gentle breezes. The water, hot at first and then merely warm, carried down the minerals it dissolved from the rocks, and before it surged into the heavens again left most of the minerals behind to form the mineral-rich solution we know to-day. Slowly the cooling earth began to rest from the frenzy of its water-vapour-rain cycle. For the first time in aeons the clouds broke and the sun's rays penetrated briefly to the large shallow seas which would one day be called the Atlantic. The sun moved visibly through the sky, slower now than in its early four hour cycle, but still bringing a new day in less than twelve hours of man-designed time.

For possibly three thousand million years the sediment has been pouring into the bed of the sea. Moulded into sedimentary rock, the weight nestled into the plastic bed of its mother earth, forming the deep depressions which allowed the water to drain from the higher areas, and the pressure from the bed of the neighbouring seas set the mountain ranges a-growing, as growing they still are.

One thousand million years had been expended on the work ordered for the morning of the third day. "God called the dry land Earth; and the gathering together of the waters called he Seas, and God saw that it was good. . . ."

In the midday sun living matter first floated timidly on the water. Individual specimens of it arrived, fed, grew and died in minutes, hours, days, but the life chain was indestructible. From green or reddish scum on the water it became a mere tinge of colouring on the wet and steaming rocks. "And the earth brought forth grass, and herb yielding seed after its kind, and the fruit tree yielding fruit after his kind: and God saw that it was good." The third day in the life of the world had drawn to its close. Its most majestic creation, the ocean, was already old.

How the Atlantic reached its present shape is a matter of conjecture. One theory is that it has in its history of turmoil engulfed whole continents, smashing them to pieces in Tertiary times. Till then it lay in a rough oval almost surrounded by two great land masses: the Atlantean continent of North America and Europe-North Africa, and Gondwanaland, covering the modern South Africa, Australia, Asia, and South America. The Tethys Sea burst its bonds when the Poles, at that time placed somewhere in South Africa and North of Honolulu, melted. It was fed by huge quantities of molten ice. By sheer weight it began to press out the silhouette it now has.

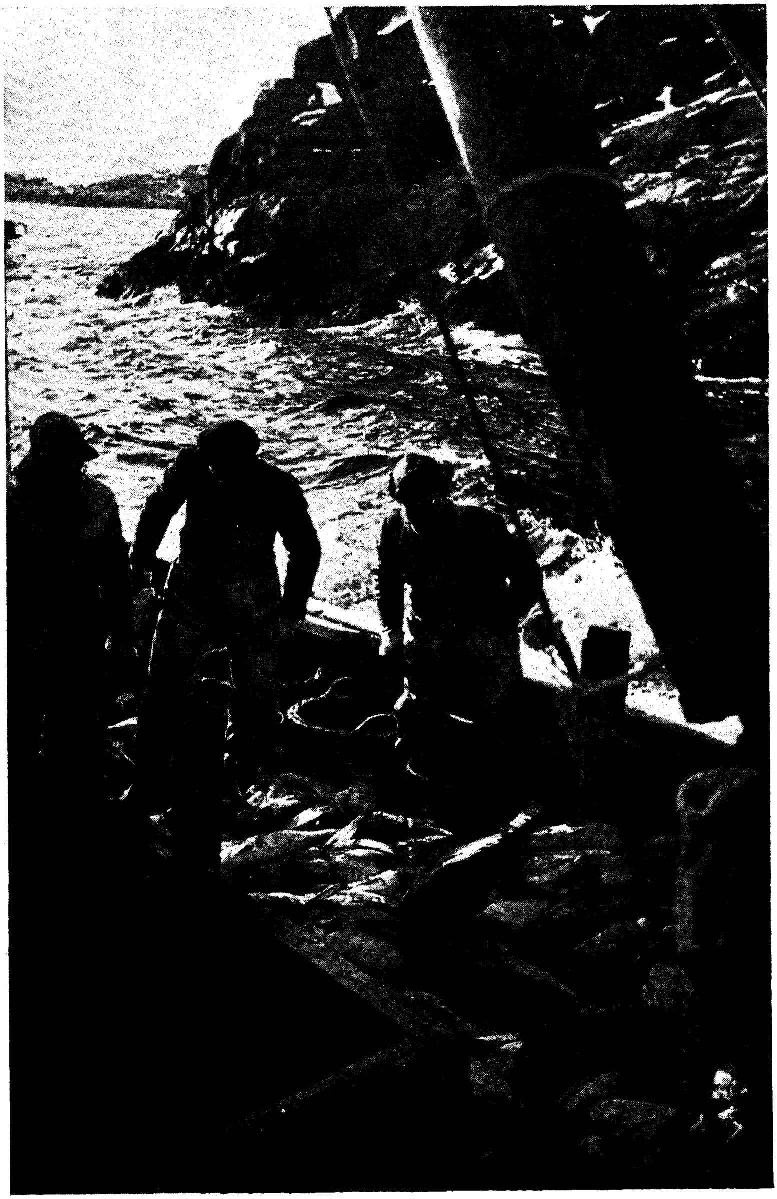
The alternative suggestion, put forward by Albert Wegener in 1914, pre-supposes that all land floats on a raft of rock. Originally there existed one land, one sea. The tremendous stresses set up on the fragile mass of land by the rotation of the earth caused it to fracture. In the Atlantic area it broke at its most vulnerable place—alongside its spine, the present mid-Atlantic ridge. Shorn of this weight the Europe-Africa mass remained still, and the Americas drifted Westwards, the mountain range remaining and sinking below the sea.

It is true that there are innumerable similarities between the Eastern and Western coasts of the Atlantic. Brazil's mighty bulge seawards would fit neatly into the void of Africa's Gulf of Guinea. Spain's Western seaboard could find ample pieces in the jig-saw of the West Indies to fill the Caribbean. Eastern Canada has the same geological strata as the Northern areas of the British Isles.

The drift or change of the continents continues. Every year the width of the Atlantic increases slightly. Although the Atlantic shows signs of the sedateness of old age, it is still capable of stretching itself with awesome strength. The design it follows may be planned, but innumerable experimentations are made while the design is worked out. It has tasted distant places, stayed awhile and tried somewhere else. The area which is now the Amazon Basin was once a great arm of the Atlantic extending as far as island-besprinkled shallows which were to be the birthplace of the Andes. It pushed its waters Northwards as far as the Mississippi Valley and it stayed there long enough for the myriad corpses of its marine animals to lay down the oil beds for the use of twentieth-century man.

It has continued to retreat from South America, defeated by the inexorable rising of its lands. Still the lands emerge with the lightening of the watery burden. Raised beaches run for a thousand miles along the South American seaboard. They are anything from 100 to 1,000 feet high to-day.

The changes leave their records to intrigue and exasperate geologists, the evidence of victory and defeat in a ceaseless war. On the North American seaboard the land records its victory over the sea with sedimentary rocks, gravel, sand and mud lying in a great bastion against the waves to a depth of 45,000 feet—the remains of lands which succumbed to the power of water in the North and East and were then piled up in the West. On the European side the ragged outlines of the map show the extent of land's defeat. Once land curved North-Westwards from Scandinavia and the British Isles to the icy wastes of Northern Canada. The sea swallowed it. The shores of Norway, at first torn to pieces, began to gain from the wreckage. In a geological second of time—less than fifteen thousand years—the shores of Scandinavia have risen from 200 to 600 feet. The British Isles, assaulted by immense forces of water and weakened by subterranean disquiet, sank until more than 1,500 feet of ocean covered them. In the Northern drift of water came the grains of dissolved clay, the yellowish fluid of sand, the myriads of stones, until the land emerged again from the sea. Other changes were more abrupt. When the sea boiled as the earth's burning heart burst through the skin, the Scilly Isles towered up to 3,000 feet, shuddered for aeons and then settled to their present uneasy position where the full force of the Atlantic's strength dashes inexorably against their rocks, wearing them away grain by grain until they will once more become sub-



2. Cod fishermen. For five centuries the peoples of the Northern hemisphere have been taking these fish in increasing quantities. Even with the six million eggs from each female at every spawning, the supply is lessening through the tens of millions caught every year from the Lofotens to Newfoundland

3. Cod drying on the fish flakes which Newfoundland fishermen set up along the coast in summertime. The Newfoundland Banks form the richest marine larder in the world

marine reefs. Catalcysms of this kind are not merely incidents in the infancy of geological time. They happened yesterday and will certainly occur to-morrow.

Only a fraction of a second ago in geological time there have been scores of abrupt changes, born of the restless conditions of the Atlantic's bed. The Canaries, normally serene islands on the bosom of the Eastern Atlantic, were born of volcanic turmoil; by volcanic turmoil they will one day surely die. Occasionally the danger that lurks in their being shows itself. On a calm and lovely September day in 1730 the island of Lancerota suddenly burst partially open. Within a fortnight lava had covered a number of villages and had reached the sea, where it caused clouds of poisonous steam. The convulsions continued sporadically for five years, and when they ceased one third of the island lay sterile under pumice. This was a mere tingling of the Atlantic sea bed compared with the shaking it gave itself forty-five years later. Somewhere in the centre of the Atlantic a major change in the Ridge occurred. The resultant convulsions were felt in the West Indies, Algiers, Canada, and Portugal. Weakness on the coast at Lisbon resulted in one of the worst earthquakes of modern times. The spectacular brand-new quay built from huge blocks of marble subsided into the earth, which closed over it. Much of the city shook itself to pieces, and within ten minutes 60,000 people were dead, and most of them had disappeared. The quake was instantly followed by a tidal wave which swallowed up masses of ships and boats. When normal conditions returned, normalcy meant 600 feet of water where once the marble quays had provided an anchorage of 40 feet at high tide.

Hundreds of miles to the North, in this minute of ill-temper, a submarine convulsion off Iceland spewed lava until the sea was covered with pumice for a hundred miles around. In 1783, thirty miles from the volcanic area of Iceland a new island appeared, to be formally annexed by Denmark and given the name of Nyoe. Less than a year later the new map of Danish territories in the palace at Copenhagen had to be altered. Nyoe had sunk out of sight. It is now a harmless reef thirty fathoms below the surface.

A similar phenomenon occurred in 1808 in the Azores. A volcano on San Jorge erupted for a week and turned a fertile land into arid desert. Three years later the submarine fires pushed a volcano from the sea, and when it ceased erupting there was a new islet in the Azores which was named Sambrine. Sambrine slowly and peacefully returned to the secret deeps from which it came.

New and more permanent islands are certain to appear some day. Darwin believed that a group was in process of formation in an area 0.5 deg. South of the Equator between 20 and 22 deg. W. of longitude. The position is on a line roughly joining Ascension Island and St. Helena. For a hundred years up to 1850 clipper captains smelt sulphur in the air in this area, experienced rough and choppy water, and saw much scum on the surface. Since then the area has been quiet.

Due to its great age, the bottom of the Atlantic is not now so scarred with tremendous fissures and rifts as other seas. But it has two trenches which must inevitably bring change to the surrounding areas in time. Off the Western bulge of Africa is the Romanche Deep, reaching 4,160 fathoms into the skin of the earth. North of Puerto Rico is a fissure of 4,780 fathoms. If Mount Everest were placed in either of them, its peak would provide a pleasant little island to the crown of which tourists could climb to admire the view on a day's outing. Through some unknown cause these abrupt changes in the contour have neither resettled themselves by upheaval nor become filled with sediment. The most remarkable instance in all the oceans of the earth of older times is to be found in St. Paul's Rocks, one deg. North of the Equator, and reaching less than fifty feet above the surface of the sea. Though the rocks cover a mere two hundred yards, they are perched on a shelf of about a square mile. The edge is practically perpendicular. For some reason this crazy natural edifice has managed to survive in mid-ocean for aeons of time.

One reason which prevents sedimentation over millions of years levelling the ocean bed as flat as the seashore is that immense rivers wind sinuously in every direction at every level, except in the uttermost depths of the folds. The size of these oceanic currents cannot really be appreciated because they are to all intents and purposes invisible. The mightiest of them all is the Gulf Stream. "Old Man River"—the Mississippi—pours water towards the sea at an average rate of 120,000 cubic metres per second. Not very far from its mouth in the Gulf of Mexico, a mightier river is gaining momentum. Off North Carolina the Gulf Stream carries water at the rate of 55 million cubic metres per second. A series of Mississippi rivers—four layers of 100 rivers running side by side—would still be smaller than the Gulf Stream.

The Isolationist politician who borrowed a short-story writer's idea and suggested that atomic bombs should be used to change the direction of the Gulf Stream at its source if Europe refused to behave was suggesting the impossible. Apart from the likelihood that a clutch of atomic bombs would have little effect on such a volume of water, the Gulf Stream has neither beginning nor end.

Currents of water partly created by the rotation of the earth and by changes in temperature force water uphill into the Caribbean. It probes for an outlet in the Gulf of Mexico in vain, and then takes the line of least resistance between Florida and Cuba, a mass of water roaring downhill in a sweep 40 miles wide and 1,000 feet deep. It varies its course considerably. Sometimes it travels along the edge of Florida, making it possible to throw in a piece of driftwood and to watch it borne along faster than it is possible to walk. More usually its path is marked by an abrupt change in wave formation and water colour well off the coast. Strengthened by another ocean river known as the Bahamas Current, it hugs the coast as closely as depth and counter-currents permit until it has reached the area off Cape Hatteras, North Carolina. It then curves North-Eastwards until it clashes with the icy water pouring South in the Labrador Current, causing the mists and fogs which have endangered the lives of seamen ever since the Norsemen first experienced them. The encounter cools the Gulf Stream considerably, weakens its power and forces it to flow almost due East. But the enormous momentum which began off Florida carries it slowly past every obstacle of wind and cold to the very edge of the Atlantic and into the Arctic and North Seas of Scandinavia.

Well known as the Gulf Stream is because of its climatic effect on North West Europe, there are many other currents of even greater value to seamen. Understandably those who sail ships are concerned only with surface currents. These run in two great circles—clockwise North of the Equator and anti-clockwise South of it. The rotation of the earth causes the Trade Winds which made Columbus's voyage possible in ships ill-equipped for sailing close to the wind (he sailed on the edge of the North-East trades on his outward voyage and the Westerlies on his return); they also made the Portuguese voyages round Africa difficult. Reaching the Equator was easy; the North-East Trades bore them that far. But the Doldrums and the South-East Trades which lay to the South made the remainder of the journey to the Cape of Good Hope both exasperating and dangerous.

There were, however, other currents which made these early voyages less easy to plot than first knowledge of the existence of the ocean winds envisaged. While the Trade winds are blowing water away, other forces have to replace it. The greatest effect of the winds is naturally where both pile up the water, causing the North and South equatorial currents. Between them runs a counter-current, caused by an increase in level of the water on the American side of about three inches. The counter-current runs placidly in the usually calm area of the Doldrums—a fact which has saved many a sailing ship from absolute disaster—and eventually turns South-Westwards into the Gulf of Guinea. The remainder of the massed water off the West Indies splits. One stream turns South and runs down the coast of Brazil, part of it turning West, and on reaching the coast is forced Northward once more. It is soon back in the Caribbean. Augmented by some of the water from the North Equatorial Current it pours into the sea around the Lesser Antilles. This time the discrepancy in the level is not a mere three inches, but several feet. Away to the North there is room, and the Gulf Stream swallows it all.

The other part of the Brazil current continues South until it meets the water which, unimpeded by land, swirls eternally round the world from West to East. The Northerly edge of this current can swing North and run through its cycle once more with the water borne along by the South-East Trades, or it can become tangled with the waters pouring from the Indian Ocean, swirling around with the Agulhas Current off the Cape of Good Hope, and contributing to some of the most dangerous and turbulent sea areas known.

In layer after layer below these currents other water movements continue obstinately to ply their forces in counter-directions. At the Poles the frozen sea causes the surrounding water to increase its proportion of salt. The cold, rich water sinks and creeps away—this effect being less noticeable at the North polar region because summer melting of fresh water from snow and from rivers decreases the salinity. But its comparative cold compared with the remnants of the Gulf Stream helps to nullify the lack of salt, and this water also begins its creeping movement towards the cold water of the mass from the Antarctic source. They meet a little North of the equator.

Submarine currents of this kind are large in number—and new ones are found whenever surveys are made. In the sea which bears a ship between Europe and America there are five distinct layers. The keel itself ploughs through a layer which is moving with a circular motion, covering a journey which will wash the shores of Africa, the West Indies, Florida, the British Isles, Spain. Below is a layer of Antarctic water of low salinity, and below that some of the 1½ million cubic metres of water which flow at 4 knots from the Mediterranean through the Straits of Gibraltar (a fact which enabled submarines to drift to safety with engines off in the Second World War). The last two are waters originating at the North and South Poles. While on the large scale which the depth of the Atlantic permits, the layers are clearly defined, they are, of course, continually mixing. The drops of water which fall from the hand of a child playing on the beach at Newquay have the same story as the water on the hand of a yachtsman in Cape Cod. Every drop has in its millions of years of existence travelled everywhere.

Added to these springs of perpetual restlessness there is the dynamic power of the tides. Somewhere on the Atlantic coasts almost every tidal phenomenon can be found. In the Bay of Fundy the variation can reach sixty feet; off Brittany forty feet. At Plymouth high tide will change by ten feet in a lunar month. In the tropics tides can occur with absolute regularity, then fail for two or three days. On the coast of South West England there are occasionally four tides in twenty-four hours. These tremendous movements of water are all born in the Southern Ocean. As the two waves surge round the globe once every 24.84 hours a mass of water spills into the lower level of the Atlantic to their North. The land masses of Africa and South America compress the mass until the original height of 12-18 inches has become as much as a yard when its giant swell surges against St. Helena and Ascension. Running over the shallows of the continental shelves, nosing into bays and inlets, it towers still higher. At a speed of more than 300 miles an hour the high water lifts Northwards, going more slowly as it grinds against the land shelves. By the time it reaches Falmouth on a timetable which ensures that the whole Atlantic is traversed from South to North in twenty-four hours, the speed has dropped to 60 miles an hour. At this comparatively gentle rate it will take the water which began to rise South of Tristan da Cunha six hours to flood the beaches from Lands End to Dover. But its power is still spectacular. Over the flat lands of Mont St. Michel in Normandie it sends its sinuous arms through the sand channels as fast as a horseman can gallop. In the Severn Estuary it produces a bore which, if harnessed, would generate a million horse power. The actual currents which the tides create are not very great in the open ocean. They start to move on each side of the tide bulge and soon disappear. Only when they are confined does the tidal current become spectacular and fast. One place where their power can be seen is from the cliffs overlooking Pentland Firth in the North of Scotland. On an absolutely windless day the brilliant blue sea running between the cliffs of Caithness and the Orkneys roars along at 12 miles an hour and when it clashes with the North Sea miniature waterspouts are thrown up.

The ocean waters are alive with movement for every second of time. In the enormous crucible which is the Atlantic mixing is endless. There is no rest, no respite from the eternal searching for desired levels. And while every droplet moves in a pattern which has reason despite every appearance of haphazard meandering, each is also crammed with life. The Atlantic is no watery desert, but a jungle.

CHAPTER II

LIFE UNLIMITED

WITHIN the tremendous expanse of water there is life transcending in variety and quantity anywhere else on earth. The ocean was the first crucible in which Nature's evolutionary experiments took place, and is the last. Time has less meaning below the sea than on dry land. Sea creatures live to-day precisely as they did in the remote ages of pre-history. Bizarre ideas in the battle for survival continue to exist—useless, inappropriate and seemingly suicidal; ideas which, on land, would have died of atrophy long since. In the sea, where wastage is of little account, and the gamble of existence is so general, myriads of these branches from the main stems of evolutionary development continue blunderingly on their way. Aristotle examined and listed more than 100 species of fish; to-day the total exceeds 20,000 and every year a few more are added. In no other ocean is this life so plenteous or varied as in the Atlantic.

The fish off the coasts and on the sides of the continental shelf are usually quite different from those of the main ocean. The categories of fish in the open Atlantic live in three main layers. The largest keep to the surface and rarely descend deeper than 500 feet. They range from tunny and sharks to the "Darkie Charlies" or lantern fish which swarm at the lower level. From the bottom of this layer down to 1,500 feet myriads of tiny fish, large-eyed and agile, exist, and then come the large-mouthed, small-eyed fish like the Grenadier. Strangely, the fish of the abysses of the ocean are widespread despite the fact that their movement from one area to another is restricted by shallows. They seem to be able to survive in the upper layers, at least at one stage of their lives, although the ridge which extends from Iceland to Scotland effectively bars the Grenadiers from penetrating Northwards, though the temperature of the water would not be markedly changed on one side or the other.

Mankind's hope of survival rests on the sea. With 70,000 extra mouths to feed every day in a civilization which exists on a robber economy of taking natural wealth and seldom trying to replace it, only this boundless maritime treasure house can provide the food and industrial materials the world will need urgently within the next century or two. Fortunately the sea can provide sustenance for man far exceeding anything likely to be derived from development of hitherto unexploited lands. It can provide power, minerals—and, best of all, food. As a larder the Atlantic is easily the richest of all the oceans, and fortunate indeed are the countries whose shores are washed by its waves.

No serious attempt has so far been made to farm the sea, though it is bound to come, for the haphazard hunting of fish which has met the demand so far is already affecting even the Atlantic's reserves. Modern trawls, scraping along the continental shelf, leave great tracks of destruction in the vegetation and despoil the food sources of edible fish for years. Only the occurrence of two wars with their minefields have staved off a serious crisis, and even now fishermen on both sides of the Atlantic are finding that the yield per hour of trawling is dropping steadily, while immensely greater distances have to be traversed to find the fishing grounds.

Britain is experimenting with fish breeding on the edge of the Atlantic with very good results. Fish fry are being bred in Scotland and put in the sea when the dangerous period of early life is safely past. A few years ago I watched a test trawl of Loch Sween where chemical fertilizers had been sown on the water at monthly intervals to increase the plankton population. I saw plaice which in two years had become five times heavier than those in a neighbouring loch. In the same area seaweed farming has become a considerable industry. The operation is economically successful where seaweed on the foreshore is present in quantities of more than 100 tons to the mile, or where it can be cut from water not more than six fathoms deep at a similar rate. On Scotland's Atlantic coastline these conditions are general. As a human food some types of seaweed are very nutritious and tasty, but its potentially most valuable use is as a substitute for starch, gelatine, and casein, at present manufactured from human foodstuffs.

The Atlantic's bed is of three kinds—the foreshore completely or partially exposed at every tide, the shelf which extends for varying distances beyond the coastline, and the abyss of the ocean proper. The deep Atlantic is the scene of ceaseless, merciless battle. Nothing on the dry land of earth, not even in the fervid imagination of Hollywood jungle film producers, can match the ghastly war for survival which continues ceaselessly in a timeless night and seasonless year. There is no vegetation in the abyss a thousand yards below the surface. Every living thing is a flesh eater, rapacious, cunning, cursed or blessed with an appetite far exceeding that of any insect or land animal, and surrounded with more than enough to assuage its hunger. Continually, through the motionless water which forever is just above freezing point, material drops gently down—a rain of dead substances, the rejected pieces of just killed fish, the excreta of those which survive, the husks of organisms which, in exuberant growth, need new skins, new shells, new bones. On their slow journey down they will be grabbed and digested by smaller and smaller entities in a cycle of birth, life, and death which continues until the material rests on the bottom. Due to the remarkable fertility of Atlantic water, this ooze covers a greater area than in any other ocean. It is at least ten feet thick. A coring device has brought up a cylinder of ooze of that length without touching the basalt rock which must lie below, and in some areas deep currents have piled them into layers of two miles in thickness. The ooze is as fine as the most perfect powder that man can make, and accurate sampling is virtually impossible from the surface because the slightest movement sends it swirling away in a vast cloud. Nor is it certain that even this billowing mass, laid down at the rate of a fraction of an inch in every thousand years, is devoid of life. There is evidence that in it worms, so fragile that they simply disintegrate into the filtered dust from which they are formed, live and thrive in some life plan which must in its turn have a dependent organism which feeds on them.

The mud which covers most of the Atlantic is globigerina ooze, and varies from pure white to brown and brownish-grey. In the deeps of the Atlantic, the huge irregular areas where the sea bed drops to more than 4,000 fathoms, the ooze changes to red clay, the very minimum to which natural forces can reduce the ocean sediment of billions of years. The globigerina ooze, subjected to the enormous pressures of these deeps, is chemically dissolved and obtains a reddish tint from the iron oxide present. Huge quantities of ores are available in this mud—meteoric iron, the star dust of outer space obtained from far-off stellar collision with the earth as well as from meteorites which fell, unseen and unknown, a few weeks ago; aluminium, gold, and tin. Finally, round the Azores and West of St. Helena are huge areas of pteropod ooze. In its pure form this is just lime. It is made from sea butterflies. One life stage higher than plankton, the sea butterfly may be as tiny as a grain of sugar or have built itself a delicate shell like an ice-cream cone an inch high. In whatever form the pteropods exist they have two fins shaped like semi-circular wings with which they propel themselves aimlessly about. Eaten, digested, and excreted their fragile little life-filled bodies fall in a mist to the bottom.

With several tons of pressure on every square inch, at these depths investigation is difficult, though no longer impossible. William Bebe, who explored half a mile down off the island of Nonsuch in the Bermuda group, peeped over the edge of this unexplored world. The British underwater television camera offers possibilities for reaching down at least six times as far as Bebe, once the problem of protecting the lens is overcome. How formidable is this difficulty of withstanding pressure was shown when Bebe's bathysphere was lowered unmanned with a defective window. On being hauled to the surface the water inside shot out in a cylindrical shape taking the door with it and shearing a half-inch notch in a steel winch thirty feet away. The solution may be in making a camera where most parts are by ordinary standards quite fragile. The fish which inhabit the great depths are of extreme fragility so that the water may circulate everywhere through them. Brought to the surface these creatures crumble into dust. This phenomenon of pressure, incidentally, is the reason why sea serpent stories are open to doubt. Enormous-sized creatures, such as giant squids, undoubtedly live at extreme depths. They are composed of water as much as of flesh, and it is quite impossible for any muscled, boned reptile or animal of the shape usually ascribed to monsters undulating along the surface to live in the inky blackness of the ocean. Whales risk diving to considerable depths, but anything approaching five miles would be fatal to them. The pressure at such a depth would be on the basis of five tons per square inch, a burden of several million tons crushing the whale's body to disintegrated pulp within a matter of minutes.

A more likely explanation of the sea serpent story is that here and there abnormally big Ribbon fish exist. This species swims with a wavelike motion of the body and has a dorsal fin which is rather like a mane. The best authenticated evidence of a giant Ribbon fish was the decomposing monster washed up in the Orkneys in 1880. It measured 56 feet in length, and when alive would certainly have justified the description of sea serpent, though it could not of course rank as a new discovery.

Although spectroscopes and camera plates give no indication of any light below a depth of a mile none of the higher forms of life in the abyss of the Atlantic are blind. Nearly all are equipped with their own sources of illumination, the luminescence originated sometimes by bacteria, but more often by glandular reaction on the skin surface. In the simplest form the fish exude a luminous slime; in other forms there are intricate structures containing reflecting layers, shutters, and lenses. In most fish of this kind the glandular excretion contains phosphorus, and this is oxidized by the oxygen of the blood, the burning taking place within the cells. But at least one fish, a member of the Rat Tail family, which lives on the continental shelf off Ireland, has a luminous gland which exudes the material for oxidization outside the body.

The purpose of the luminescence is not fully understood. In some it may be to attract a victim, in others to confuse a pursuing enemy. The luminescence is probably closely akin to colouration of birds and animals, serving a variety of purposes—camouflage, sex attraction, warning, and food attraction.

Fascinating as the great depths of the ocean may be it is on the edge of the continental shelf that the most fertile existence prevails. These enormous hillsides, which transcend in grandeur anything which remains on earth, are not particularly precipitous, though scarred with deep gorges and complex rifts. In the Atlantic one network of canyons between the Azores and Bermuda is as large as the Mississippi. The usual gradient is about 1 in 10, the sort of hill which any car can take with ease, though a stupendous incline which continues for 3,000 fathoms is unknown on land. Some of these canyons are relics of erosion when the shelf was above sea level. Others are the sub-ocean channels of existing rivers. The best-known is at the mouth of the river Adour, which enters the sea near Biarritz. The water runs through a canyon 117 fathoms below the general level of the shelf and, fifty miles out, when the bed plunges to the ocean depths, the canyon has sunk to 1,500 fathoms below the level of the surrounding rocklands. The Congo runs along a wide sub-ocean canal for 400 miles from the African coast, and the Hudson's channel continues for 150 miles from the American mainland in a great canal more than six miles wide.

On the long, steep slope to the depths nature has caused life to run riot. At first there are rocks, then sand, and finally mud. The varying types of terrain, the different temperatures, and the changes in the salinity of the water encourage every form of creature to flourish. Life changes imperceptibly from flora to fauna, from the sponges and anemones to the vertebrate fish. The motionless water allows plants of the utmost fragility to grow—sea fans, dead man's fingers, trellis weed. Among the foliage innumerable creeping things, like glass prawns, tube worms, spider crabs, feed on the molluscs, and in turn they feed the jelly fish and squids. Next, on this hill of plenty, myriads of fish, including the salmon, building its body with months of voluptuous feeding, find illimitable food, as they themselves provide illimitable food for others. The edge of the abyss which rings every mile of the Atlantic seaboard typifies nature in her most spendthrift, lavish mood. A dredge dropped near the base of these hills and then dragged to the surface of the sea along its gradient will come up full to the brim with pulsating life, where even in the death throes engendered by deprivation of water the eternal battle goes on, the creatures snapping at one another; the crinoids, looking like delicate flowers, stretching out their deticulated arms in search of their last food, even as the delicate fronds begin to wither away.

The coastal fish do not often penetrate far into the ocean. They remain in the area where the continental shelves exist. The herring and mackerel are examples of these. If they do set out to move across the ocean then their passage is remarkably closely restricted by temperature zones which run fairly evenly from East to West. For this reason it is quite impossible for fish which live on the Atlantic seaboard of the United States to swim round Cape Horn or through the North East Passage to reach the Pacific seaboard. Yet very similar fish are found in both oceans, the differences being identifiable only by experts. This applies particularly to the fish on either side of the Panama isthmus. The sea was last over the isthmus in the Eocene period, and the slight changes which have occurred since then indicate how leisurely is the evolutionary development of marine life.

Some fish, though they can find the right temperature, are unable to overcome the currents. The sardine or pilchard exists in immense swarms on the Atlantic seaboard of Europe, and another species has penetrated to all parts of the world except the coast of Eastern America, where conditions as regards temperature are ideal. In a few instances the currents have borne fish to areas where they have to remain because temperature factors prohibit movement anywhere else. Tristan da Cunha and St. Paul are lonely islands in the

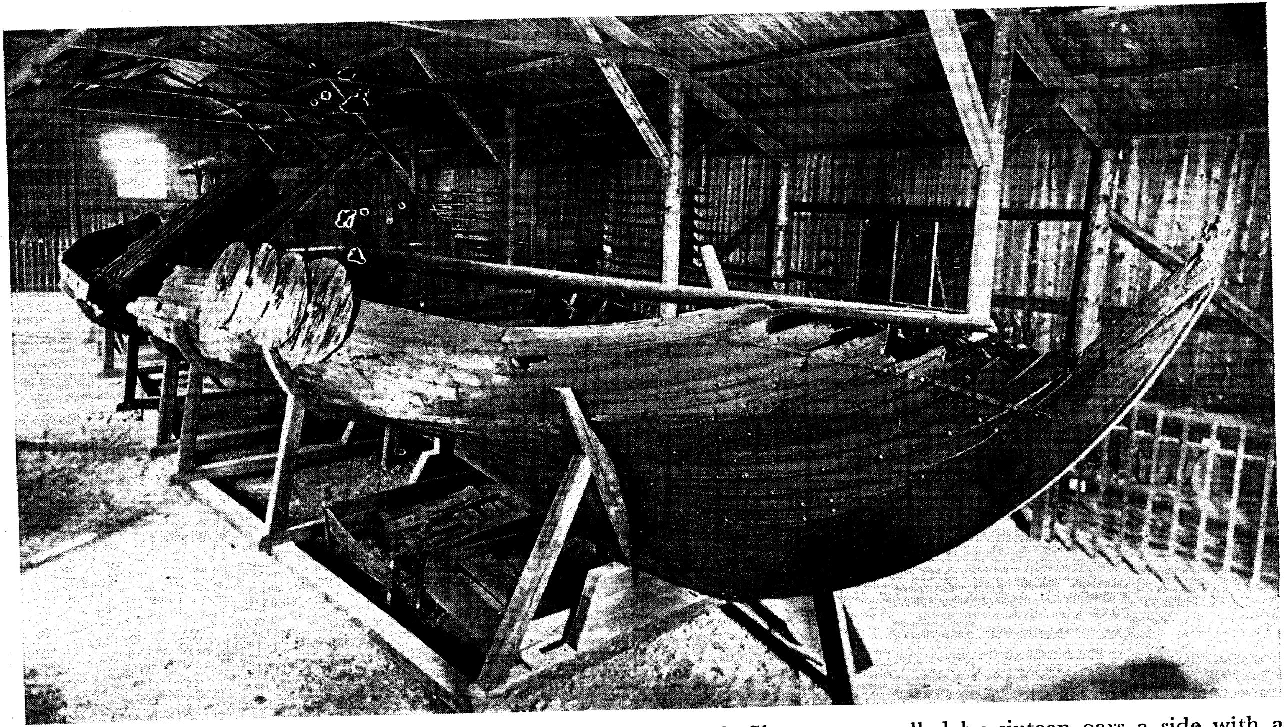
Atlantic, four thousand miles distant from one another. A current from the Antarctic connects them both. Off the coast of both islands are fish of identical species which are not to be found anywhere else in the Atlantic or any other ocean. They are kept in their two prisons as surely as if netting had been placed around these lonely islands—until some major change in the sea bed or the currents starts a new experiment of evolution. These changes are comparatively frequent, and occur abruptly. But, considering the volume of water and the aeons of time involved, conditions in the Atlantic remain remarkably constant, and they are in fact in such a delicate balance that a considerable amount of sea life depends entirely on it and any change causes disaster. Below the Gulf Stream the Tile fish was caught and recorded as a new species in 1879. Its identification was not due to any deliberate exploration but to the fact that a change in the route of the Gulf Stream was bringing it nearer the American coast, and immense numbers were found to be flourishing, from 70 to 250 fathoms deep. By 1880 a big fishery industry had been set up, for the fish had a delicate flavour and the fact that specimens up to 50 lb. were common made long line fishing very profitable. In the spring of 1882 it was all over. Millions of the fish were found floating dead over an area of 15,000 miles of the Atlantic, killed by a sudden inrush of cold water. Only now, seventy years later, are they gradually returning.

In the riotous life of the sea, where man's knowledge is still rudimentary and the future for exploration gives promise of great reward, some indication of the fascination inherent in its study is provided with the knowledge of those creatures whose existence has already assisted the progress of mankind.

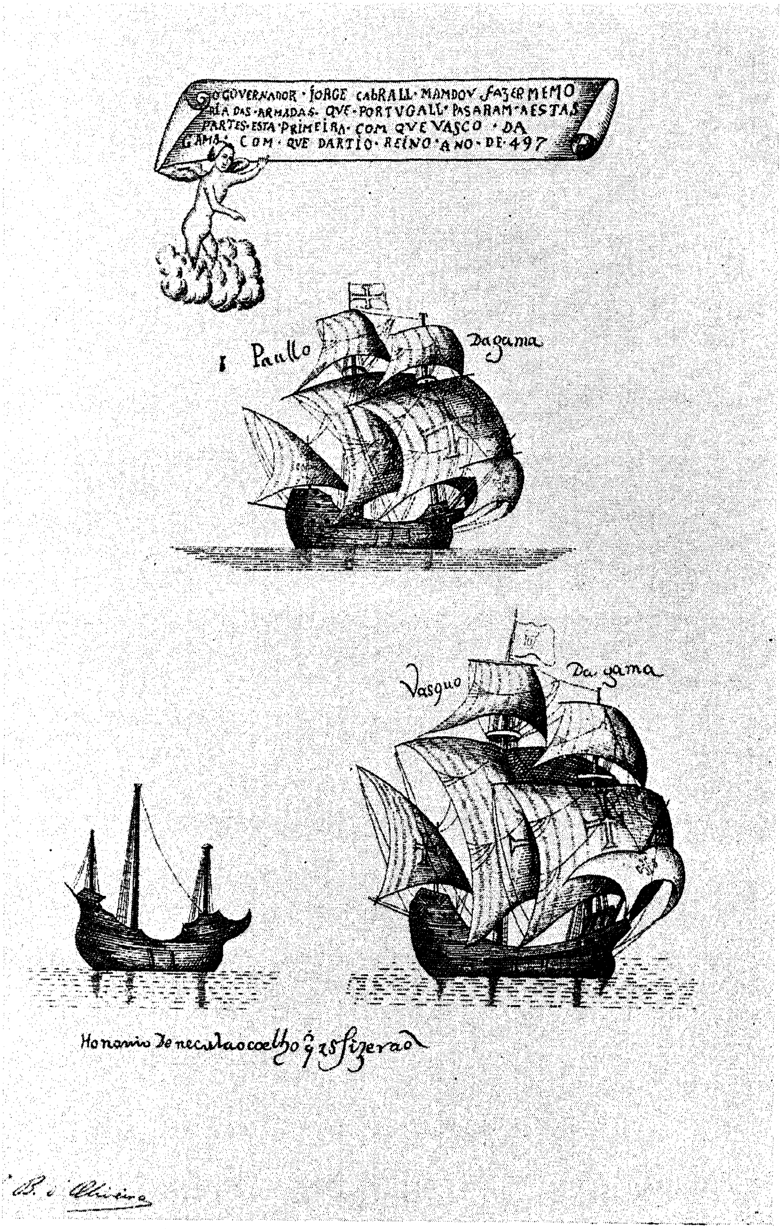
As good an indication as any of the size of the Atlantic is the statement that tens of thousands of whales live in it and surface every few minutes—yet the glimpse of a whale on a normal voyage across the ocean is exceptional. One reason is that whales, numerous as they still are, have been almost exterminated in some areas; more to the point is that the animals are very shy and in recent times have wisely shifted from the main shipping routes. A century ago the whale was a real menace to shipping, collision sometimes causing disaster to clippers, and even the wooden steamships had their bows stove in by them. Nowadays, in this margarine-eating era, the blue whale is the most commercially valuable. It is the largest animal in the world, probably the largest that has ever lived, and regularly exceeds a length of 100 feet. During the summer these whales live in the extreme Southern Atlantic, feeding on krill at the edge of the pack ice. Krill are merely a form of plankton, rather like small shrimps, and the whales eat this food in quantities at which the imagination boggles, even when dealing with marine statistics. A ton of undigested krill, indicating that they have been swallowed within the previous four hours, has been found in a captured whale's stomach.

Because of the stories of the rich harvest of the Antarctic whaling grounds, where factory ships like the *Balaena*, handling 2,500 whales a season, indulging in a holocaust of destruction for months on end, the general impression is that whales keep to the polar areas of the ocean. In fact, the mating whales move Northwards and hold their nuptial ceremonies in the sub-tropical waters off Africa and South America. They cannot live there for long, because of the absence of krill, seemingly the only food on which they can live.

The sperm whale, now left alone when the more valuable blues can be found, was the chief victim of the whalers of the *Moby Dick* era. It is found chiefly in the tropical zones of the Atlantic, living on cuttle fish, squids, and jelly fish. Pursuing them was a brutal and dangerous trade certainly not exaggerated in Herman Melville's famous story. At the time of the American War of Independence more than 700 American whaling ships were based on Nantucket, and the British whalers of Hull, Dundee and Peterhead numbered about 200. They hunted whales wherever they could be found—off the Azores, along the North African coast, and in summer-time around Iceland, the Shetlands and the Faroes. The whales they captured were mostly sperm whales, but they also took the blackfish whale and the killer whale. These types live in schools of twenty or thirty, in contrast to the sperm and blue, which are rarely seen in groups of more than five. The



4. The Gokstad ship excavated from a Viking burial mound. She was propelled by sixteen oars a side with a single sail amidships. In a vessel such as this the first Europeans crossed the Atlantic to America in the tenth and eleventh centuries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5. The ships used by Vasco da Gama for his successful voyage to India via the Cape of Storms in 1497

killers are the most dangerous of all Atlantic creatures. Though they give way to the mighty strength of the sperm whale, they will move like wolves of the sea on a school of seals and swallow them whole. If they come across a Right whale, now almost extinct but once common in the Bay of Biscay and right across the shipping lanes on both the European and American coasts, they rip at the brute's enormous mouth in order to eat the tongue and throat.

Sperm whales are still to be found in the North Atlantic within sight of the Scottish coast. They follow the herring shoals, and sometimes keep with them for days on end, gulping down the fish by the hundredweight. The herring never attempt to move from the vicinity of their enemy, any more than they do in the case of the fleets of drifters which spread nets across their route and capture them by the million.

The mystery of the herring's migrations completely defeated early observers. The movements of the shoals were a standby of the lecturers and missionaries of a century ago, when science was sometimes turned into an ally of religion instead of an enemy. There must still be many fisher folk alive to-day who remember the humble herring being quoted as a food supply especially arranged for the God-fearing inhabitants of Britain. This theory of divine generosity doubtless helped many to be satisfied with this somewhat humble dish in the absence of the meat their "betters" ate. More ingenious were the explanations of the occasional failure of the food supply. One such essayist into the divine order of things, after mentioning the awe and veneration one must feel at the thought of the Mighty Power which directed the herring "with utmost regularity to offer themselves to our expecting fleets", tackled this thorny problem. "It should fill us with the most exalted and grateful sense of His providence", he said, "for impressing on these fish towards a southward migration, when the whole is to be benefited, and to withdraw it when only a minute part is to suffer."

Modern knowledge has certainly maintained that sense of awe, and for better reasons. The variation in this colossal ebb and flow of herring life is infinitely more majestic than any specious arguments about some facile on-off system of Britain's food supply to punish a group of sinners and reward the righteous living farther down the coast.

An acute sensitivity to water temperature is the controlling factor in the movement of the herring shoals. It is probable that, with the exception of eels, the herring surpasses all other fish in the Atlantic in numbers. It is not such a fertile fish as the cod, the ling, or plaice. Not more than 50,000 eggs are produced by the average female herring, and often only half that number. The chances of survival are proportionately increased, for while in the prolific fish like the cod with six million, the eggs float on or just below the sea surface, and are therefore the prey of wind, storm, and a host of marine and bird life, the herring eggs quickly sink to the bottom and attach themselves to the sea bed. Their biggest risk is to be eaten immediately after they are spawned. Mackerel, haddock, and many other fish follow the herring shoals, gulping down the freshly laid eggs by the myriad. They hatch in eight days if the water is warm, but the process will be slowed down to forty-seven days without harm if the water is only just above freezing level.

There are about 3,000 million herrings in a big shoal, and a hundred shoals at any one time are flourishing in the Atlantic. Only by travelling in the sea at a time when herring shoals are present can any conception of the numbers be obtained, and then only with the aid of a fertile imagination. I recall a pleasurable interlude in my service with the R.A.F. in Scotland when I went out on a Stornaway herring drifter, in search of the first signs of the harvest which would move inexorably round the North of the British Isles and work down the coast to the English Channel in a matter of four months.

The Atlantic is a translucent blue in these Northern waters on those rare days when the sun shines from a wind-filled sky. Where the herring shoal lay on the sea bottom, awaiting the protective darkness of night, the sea was opaque with the mucus which rises in billions of globules from the fish to float on the surface. Here and there a herring, victim of some submarine battle, appeared dead on the surface until a swooping gull dived for it.

The herring in its dress before it has been netted, stored and handled in the fishing ports, is a lovely thing, a very different fish from the dull grey food which lies on the fishmonger's slab. It is of many shades of glittering gold and silver, the hues imprisoned in the fragile scales which are largely brushed away by handling out of water. The back is darkish green, flecked with blue, while the belly has a rosy tint which fades while one holds the freshly caught fish in the hand.

Those delicate colours are not often seen, for herring can be caught only at night. As the light fades in the upper layers of the sea the shoal begins to move as a single body, every one of the millions of fish in it moving upwards simultaneously, the shape of the shoal hardly changing as the mass swims onward in a journey which alters very little year after year. Yet the herrings' itinerary is not fixed by any immutable law of nature. Its movement is mainly concerned with the temperature and salinity of the water, and indirectly by the food, which is similarly affected. With the annual increase in sexual activity spurring the herring on from its accustomed lazy existence, the fish seek water low in salinity and low in temperature. Inevitably this means the snow- and ice-made waters of the Arctic pouring Southwards in a mighty flood. The fish reach it and are borne along with it, taking the path of least resistance and going with the current. Though the warmer central Atlantic is pushing its mass of water Eastwards against the bastions of Europe and running through the only exit it can find, the English Channel, the cold water from the Polar Atlantic is the stronger, and through the eddies and counter-streams of the North Sea the cold water, with its herring burden, slowly and inexorably moves down the coasts of the United Kingdom and Norway, and out through the Straits of Dover. In the five months of the wedding journey of the herring billions of eggs are laid on the bottom of the ocean during each daytime while the fish are resting. Only fish of four years old or more are captured in the nets which, off England alone, can bring up 75 millions of herring a night. By October the waters are too warm on the surface, and the herring drop to the sea bed, moving back to their placid resting place at the edge of the continental shelf of the northern Atlantic. Since 1933, when the Channel entrance warmed up, herring have not swum on the surface of the sea, and the one-time valuable December-January herring fishery of Plymouth has been destroyed, though it is still often possible to fish for herring with rod and line while sitting under a lamp on Plymouth Hoe.

While the herring are seeking the cold water they love, another fantastic search for the right environment is nearing its finale, in this case a search for warm water.

There are few creatures with such a remarkable life cycle as the eel. Its origin has fascinated observers since pre-Christian times, and the mystery of it caused many excusable theories, of which the suggestions that it originated from parasitical worms in human beings and cattle, from the slime on ponds, or from the warmth of sunlight on water are typical. The eel is an elusive animal. In times of drought it senses that water may become short or disappear and it digs deep into the mud, where it sleeps away the dangerous period. When the water returns it emerges none the worse. It hates light and cold, and is therefore rarely seen during daytime or on those chilly days when its migrations from rivers flowing into the Atlantic begin. Yet the eel, in one or other of its life stages, challenges in numbers anything known to man. The swarms of locusts which darken the sky for days in East Africa and Arabia are no greater than the myriads of eels which move in a pulsating mass across thousands of miles of the oceans and turn areas of water almost to the consistency of cream in the rivers of the European and American seaboards. This invasion begins in November and continues until March.

Only once have I seen a mass influx of elvers (or, as they are called in Brittany, piballes). They were moving into the estuary of the Vilaine from the Atlantic. It was a December night, with a brilliant moon after a day of warm, wet weather. The tide was abnormally high, piled up by a strong West wind. From the bridge which connects the departments of Vilaine and Côte du Nord the piballes pulsated up river, appearing and reappearing in tens of thousands, two to three inches in length and visible only because of the moonlight flickering on their transparent bodies in the grey sullen water of the river. The pillars of the bridge held up the even flow, and the mass circled around, trying to find the way through with the main stream. This band of living fish was a yard across, and, according to the fishermen who were gathering in the piballe harvest for a preserve famous among epicures in France, about two feet thick. Its length, passing us at a mile or two an hour, would be three or four miles long, the column breaking up and stopping only with daylight, when the whole procession would sink to the bottom and bury itself.

The elvers moving into Brittany had completed a journey of some four thousand miles. This swarm was but one of hundreds invading France that night, and they merely part of an army which would continue to arrive week after week until early spring.

The solution of the mystery of the eel's origin was a brilliant piece of work by Professor J. Schmidt, a Danish scientist, during 1920 and 1921. Before this he had spent years trying to find grown eels in the Atlantic. Apart from an occasional catch in coastal regions of Spain and France and in the English Channel, the drags and nets produced nothing. The eels, known to move in their millions from the rivers of Europe and Africa, simply disappeared. Accordingly Schmidt began to investigate from the other end of the life cycle. The elvers taken by the bucketful from any river in winter time were three inches long. The farther West into the Atlantic Schmidt went the smaller the larvae became. There was no exception to this rule. The silken nets never found varied sizes in the same area of the ocean whatever the time of year. The research ship nosed West-South-West, then West, and finally West-North-West. In an area between 48 and 65 degrees West of Longitude, off Bermuda, and tipping the Northern part of the Sargasso Sea, the larvae were microscopic in size—only just hatched. Here, 160 fathoms down, the myriads of fertilized eggs float free, the seed of a writhing mass of male and female eels believed to perform their nuptial ceremonies in the perpetual darkness of crevasses of two miles deep and more. The parent eels, spurred on by sexual excitement, must swim at the rate of about 600 miles a month to reach the area in time for the mid-winter breeding. Only a tiny fraction can ever arrive, but they are sufficient to send that moving band back across the Atlantic on a more leisurely journey—a journey which will take three years to complete.

A facile solution, if it is a solution, of the motive of this eel saga is some sort of memory stimulant handed on from generation to generation. It is far more probable that the eel's desire for warmth is the chief spur. The adult eel, transformed by sexual urges from a very lazy creature content to wallow in the mud, is impelled to move. It leaves the cold waters of the rivers for the warmer sea. Once there it moves inexorably on towards the Gulf Stream, sensing that the farther it travels Westward the warmer the water gets. In the currentless Sargasso Sea the perfect temperature is reached, and simultaneously, nourished by the richer food that the warm waters have provided, the eel's sex cells reach a peak of fertility. The eel larvae are extremely helpless at birth and for a long time afterwards. Their tiny fins are too small to help much in movement. Their digestive systems are so rudimentary that they are dependent on the solution of material in the sea for food, a restricted diet which makes their growth inordinately slow. But their shape and weight is perfect for drifting with the current. Pushed out of the Doldrums of the Sargasso by the sheer mass of their fellows they reach the eddies of the Gulf Stream. In three years, attacked by every living things in the sea that can batten on this moving mass, the survivors reach the rivers from which their parents set out nearly four years earlier. At the age of seven in the case of male eels, and ten in the case of females, those that remain will set out on the Atlantic journey to their birthplace and the cycle will once again begin.

CHAPTER III

JOURNEYS INTO CHAOS

THE earliest voyage along the edge of the Atlantic recorded in some detail was that of Kolaios about 650 B.C. Appropriately enough his accidental journey through the Straits of Gibraltar is commemorated in the New World, for he gave his name to the Dollar. The pillars through which he sailed, garlanded to celebrate the fact, are remembered in the sign $. Kalaios was an unwilling explorer of the chaos beyond the Pillars of Hercules. When he set off from Samos with his cargo of pottery and wine he was bound for Egypt. He dropped across the Mediterranean, shifting slightly Eastwards and successfully made landfall on the African coast. The storm which then sprang up appears to have been of almost unbelievable duration and ferocity, but the fact remains that by the time he was able to regain control of his vessel the vast bulk of Gibraltar loomed ahead. Considering the wealth of frightening stories of the half-world that lay beyond the narrow sea lane under his prow Kolaios must have been a brave man, for instead of turning back, he sailed through the Straits on the relics of the Easterly storm wind and then turned North. He put into Cadiz to trade his cargo for silver, and made about £100,000 profit on the deal. Possibly his greatest triumph was to navigate successfully back to the Mediterranean and to reach home, where with good reason he presented a gift worth £10,000 to the goddess Hera.

This voyage was a minor event compared with the expedition reported by Herodotus which took place about the same time. The Phoenicians were supposed to have sailed round Africa from East to West in two years. Herodotus dismissed the story because he did not believe that sea surrounded the

African continent. To modern thought the journey was accomplished with remarkable speed if, as was claimed, the explorers stopped long enough to sow corn and reap it to maintain the food supply. The Phoenicians were undoubtedly superb seamen. Only their high regard for trade has prevented more details of their voyages being known. They seemed to be quite unaware of the imaginative concept of their expeditions in search of commercial opportunity. Having obtained trading rights in areas far beyond the borders of the known world—in Britain, on the West coast of Africa, even in the area beyond the Straits of Malacca—they guarded their monopolies well, and their secrets of navigation died with them when Carthage was finally overwhelmed in 146 B.C.

The Carthaginian sailors nosed their ships through the Atlantic as far as Britain about 500 B.C., and shortly after that there was a rival power attempting to extend its trading routes. Xerxes of Persia ordered a man named Sataspes to emulate the Phoenician circumnavigation of Africa. He was told to sail in the opposite direction. Sataspes set off in 485 B.C. and managed to evade attack on the Mediterranean run and pass Gibraltar. How far he reached down the African coast is unknown, but he saw pygmies, which suggests a penetration to at least 10 deg. North of the Equator. It is possible that he sailed as far as Duala in French Equatorial Africa and then, finding this was not the half-way mark but a turning point where the coast again stretched Southwards, lost his courage and returned home. His remarkable achievement was regarded as a failure, and he was executed.

Before this, seamanship had been extending knowledge of the Atlantic to the North-West. Another Greek trader had gone much farther than the involuntary expedition of Kolaios. There were by this time maps of the known world which ended abruptly at the Pillars of Hercules. The new pioneer, Midacritos, had a journey ahead of him far less known in theory than a space ship captain to-day would have on the first journey to the moon. Yet he reached Brittany and Cornwall and brought back the news of the islands of tin. The Carthaginians either heard of this story or had discovered the fact for themselves, for about the same time as the pioneering work of Midacritos they began regular sailings on the tin-trade run from North Africa to Cornwall. A rather doubtful account—it was not set down until eight centuries later—claims that Himilco reached Ireland and on the return journey was blown Westwards until he was becalmed in a zone of weed. If this is true then one Carthaginian at least saw the Sargasso Sea, though it seems very doubtful that on an involuntary voyage of such duration he would have been carrying sufficient water to avoid death. Ships invariably had at least a few galley slaves to supplement the sails, navigation was impossible except by keeping within sight of the land, and there had to be frequent stops to replenish supplies. However, that is the story, and as the Sargasso Sea is a phenomenon not easy to invent from the imagination, he would be a rash man who denied the story out of hand.

More reliable is the record that in 470 B.C. Hanno took a very large fleet through the Straits of Gibraltar and reached the coast of Sierra Leone. There is also evidence that some of these ships stood out to sea far enough to sight the Canaries and Madeira. On the return journey they possibly reached the Azores as well.

This convoy was a tremendous enterprise, consisting of sixty ships, each powered by twenty-five oars a side. The crews, emigrants and troops taken along are said to have numbered 30,000, which means an impossibly large average of 500 per vessel, unless, as is feasible, the sixty ships were the escorts for transports. The large quinquiremes of Carthage carried about 300, though the typical ocean-going vessel for centuries was much the same as that on which St. Paul was a passenger when the vessel wrecked itself on the rocks of Malta. This carried 276 people. Whatever the actual size of the Hanno fleet, it certainly nosed far into the Atlantic along the African seaboard. Groups of people were landed at intervals to form settlements and the main fleet reached as far as Sierra Leone. They returned with stories of elephants, crocodiles and tom-toms, and of chimpanzees which they took to be human. Three hairy ladies were chased, captured and invited in polite Carthaginian to accompany their hosts on the return voyage. These unwilling guests promptly bit the sailors by way of reply and were killed. The skins caused a sensation when displayed in the temple to Moloch at Carthage.

In the third century B.C. Marseilles was one of the greatest trading ports of the world. As a normal routine vessels were sailing from its quays to coastal areas of the Atlantic seaboard, and one merchant mariner, Pytheas, who was a typical Greek in that he combined philosophy with his means of living, reputedly sailed right round Britain. He was fascinated by the tidal changes he saw, and noted that they were greatest when the moon was full and smallest when it waned. He claimed to have reached Ultima Thule after a voyage of six days from the British coastline. In that time Iceland would have been rather too distant unless the weather was extremely favourable. So, for that matter, would Norway. He may have found the Orkneys or the Hebrides, though the most likely place is the Faroes. It must be remembered that direction and speed were virtually unknown factors in bad weather or on cloudy nights once the ship was out of sight of land, and no real claim can be made for any of these identifications.

With the decline of Grecian and Carthaginian power, sea exploration declined too. The Romans regarded maritime activity as a necessary evil, to be avoided whenever overland routes could be used as an alternative. When enemies endangered Rome fleets were built—vast fleets stationed in magnificent naval bases. But the ships were really floating forts and the men who manned them were soldiers, not sailors. Almost all their mercantile efforts on trade matters were concentrated towards the East and South-East. They created an attitude which lasted until the real import of Columbus's discovery dawned on the world. As a result the Atlantic was again a desolate sea, except for the fishing boats, the canoes and the dug-out logs, which timidly floated a matter of furlongs from the land. Yet the restless ambition of Rome to embrace the whole world within her power brought some results. The squadron which under the orders of Domitian's general Agricola successfully sailed round the British Isles in A.D. 84 must have been under the command of skilful captains and manned by resolute men. How often sections of this journey were patrolled is unknown. Military commanders reported home with an eye to future promotion and political advancement. The Roman central government were not interested in scientific research. They preferred details of successful skirmishes, booty captured, natives enslaved, fortifications built. Yet reconnaissance voyages deep into the Western Atlantic must have taken place. About one hundred miles from the Irish coast, on the Porcupine Bank in the area 54 deg. North and 12 deg. West a twentieth-century trawler's net brought up a fragment of Roman pottery. It may have come from the wreck of a Roman galley swept out to sea by a storm (it is an unlikely direction for any severe gale to take a ship patrolling the Irish coast), or it may have been the empty drinking jar of a Roman Columbus, searching for new lands to come under the sway of the Roman eagle. That tiny shard is the last evidence of Atlantic exploration for some centuries. The Dark Ages put the grey Atlantic into shadow as well as the lands of Europe itself.

Nine centuries pass before there opens the most fascinating of any chapter in the story of Atlantic exploration: the Norsemen's voyages to the American mainland. It is a wonderful story because of the superbly matter-of-fact way these almost amphibious human beings tell of their journeys without excitement or exaggeration. It is an incident still half hidden by time, and not without the promise that more will be known. The Polar zone was much warmer at the period of these expeditions, which began a thousand years ago, and now there are signs that the ice is receding once again. Perhaps there are more Viking ships to be discovered, more relics of those fantastic expeditions which seemingly nosed far down the coast of the modern United States.

One thing helps the conviction that the Norse stories can be true—and that is the seaworthiness of their craft for such a voyage. Losses by the exploring Greeks, Cathaginians and Romans must have been appalling. Although the Mediterranean can be very nasty, the ill-temper and uneasiness even during calm weather of the Atlantic were something that the shipbuilders of the Ancient World could not understand until they had experienced it. But the Norsemen knew no other kind of sea. Their ships were built to ride the worst that a North Westerly Atlantic gale in its death throes on the Scandinavian coast could do. Though the ships were undecked, the row of warriors' shields served as a protection against breaking waves as well as against enemy spears. Their ships were built of oak, and the shape chosen by the builders by instinct made for as much seaworthiness as any scientifically conceived plan of a modern lifeboat builder. The use of oak made it possible to build ships of remarkable size in relation to their beam. A ninth-century serpent ship excavated in the Orkneys was 130 feet long. The famous Gokstad ship was 80 feet long and 16½ feet at its widest. Vessels of this kind weighed up to 50 tons and could carry 30 oarsmen-warriors as well as the chief and his family. There was plenty of room for provisions, including living animals and water carried in skins. Though all Viking ships carried a square sail, oars were always used as well. It has been estimated that in normal conditions of a following wind of force 5, the combination of sail and oars would produce a speed of twelve knots. When a replica of the Gokstad ship was built in 1893 it sailed from Norway to Rhode Island in forty-four days. Captain Andersen and his crew of eleven amounted to fewer, of course, than a normal Viking's complement, and the latter would probably have cut this time by at least four days. But the important point was that the modern trip was uneventful, the vessel never shipped water, and it maintained a steady ten knots for most of the journey.

The account of the Norsemen's voyages to the New World are wrapped in a mass of personalities about minor characters, their love affairs, and the general intrigues of this fierce and emotional people. On top of that comes the fanciful art of the tale-teller. The dangers of those remarkable voyages into the unknown Atlantic tend to be minimized, understandably with a people who accepted the menace of the sea as the inevitable and largest factor in their lives, and steadfastly refused to be amazed by what the sea could do.

Like the Greek trader who passed through the Straits of Gibraltar, the first known Norseman to reach America arrived by force of circumstance. He was Bjarni Herjolfsson, of Iceland. His father had been among the first settlers there. Bjarni was a wealthy man, making a trading voyage every alternate year to Norway in his own ship. On returning home in the year 985 he found that his father had gone to Greenland with Eric the Red, founder of the new colony in that country. Without unloading his cargo, he set off for Greenland and after a fair journey of three days his ship hit a Northerly gale. The storm drove the vessel on for an unreported period until it reached a foggy area—familiar to every sailor who has been on the Newfoundland Banks. A day after they emerged from the fog the crew saw land covered with well-wooded hillocks, which is believed to be the coast of Maine. As they were seeking Greenland and realized that they had come much too far South they turned about, and after losing sight of land, again reached the coast (possibly Nova Scotia). The crew wanted to go ashore, but Bjarni forbade it, and with a South Westerly wind he sailed for three days when again land was sighted. It was mountainous, covered with glaciers, and impressed Bjarni so little that he considered it good for nothing—a not unreasonable assessment of Newfoundland at first glimpse of that unwelcoming land, though the description would better fit Labrador. This identification does not tally with the later facts, however, for after sailing along the coast they realized the land was an island. Leaving the land astern they made very fast time, reefing the sail because the wind was strong enough to destroy it, and reached Greenland after four days. Bjarni had had more than enough of exploration. He gave up sailing and became a farmer. If he had listened to his crew's suggestion, he could have been the first known man of the Old World to set foot on the New, instead of the first just to glimpse it. But his story made grand stuff for the tale-tellers who whiled away the long nights in the Viking homes that winter.

Fourteen years later, Eric the Red, part ruler of Norway, met Bjarni and asked him about the lands he saw, and incidentally reproved him for not being able to make a better report. Eric was by then an old man, and he allowed his son Leif to lead an expedition to the Western lands. Young Leif had lived for some time in the Hebrides and in Norway. He was a fervent convert to Christianity, then sweeping Scandinavia through the missionary zeal of Olaf Tryggvason, who achieved his conversions by the simple procedure of offering everyone baptism or death. Leif's main purpose in going to Greenland was to preach Christianity there. His ship was manned by a crew of thirty-five and after an uneventful voyage reached either Labrador or Newfoundland, which he called Hulluland, the country of flat stones. They landed and prospected for a mile or so into the interior, finding the country as unprepossessing as it looked from the sea. Their next stop was probably around the Halifax area of Nova Scotia. They remarked on the whiteness of the sand on the seashore and the plentiful woodlands behind it. The inborn disquiet of the Norsemen when out of their element, the sea, had the result that the landing was again a mere token exploration, though there is no indication that they found either animals or human beings to cause their uneasiness. After formally naming the place Markland because of its woods they returned to the safety of their serpent ship and sailed before a North-East wind. The Westerly recession of the coastline meant, of course, that they lost sight of it, and the result was a journey of two days and nights which brought them to much more pleasing conditions. They could have well reached as far South as Chesapeake Bay in this time but it is more likely to have been the Cape Cod area. They sailed round a cape and were soon afterwards grounded by the ebbing tide. They moved their ship into an estuary, then into a lake, and began building huts to stay the winter.

It must be remembered that conditions were warmer in A.D. 1000 than they are to-day, but a case can be made for penetration much farther South on the basis of the delighted reports of Leif and his men that there were no frosts, the grass did not wither, and that on the shortest day of the year the sun was well above the horizon at 3 P.M. It was autumn when they landed and made cautious sorties, never more than a day's journey out and back, the principal discovery being unlimited supplies of what they called grapes but were probably cranberries. They gathered large quantities of these, kept them until the spring, and with this rather dubious cargo, returned from Vinland on a non-stop voyage to Greenland.

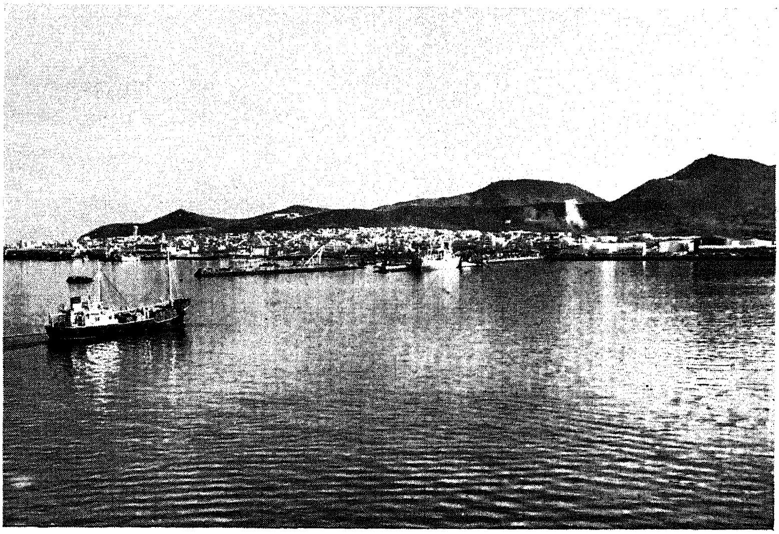
The superb navigation of the Norsemen enabled Leif's brother Thorvald to sail to the former's base as soon as a ship manned by a crew of forty was ready. So normal is the voyage regarded that details of it are omitted from the story. If these people had been colonizers as well as sailors the white races' permanent settlement of North America would have been advanced by five hundred years. Thorvald arrived, as his brother had done, in the autumn. He and his men lived on fish that winter and in the spring began a big coastal survey, one group in the ship's boat and the rest in the ship itself. They spent the whole summer on this work, the most notable discovery being a deserted wooden hut (presumably a wigwam of bark), and once again they spent the winter in undisturbed peace. This wintering without doing any exploration rather belies Leif's accounts of very mild and frost-free conditions, and spoils some writers' theories of Florida as the base. Early in the following summer a minor disaster befell them when a sudden storm drove the ship ashore near a cape (Cape Cod is the generally accepted locality) and they had to rebuild the keel. When the ship was again seaworthy they coasted along the Southerly side of the cape and met their first Red Indians—nine men hiding under three upturned canoes.

War had crossed the Atlantic. The Norsemen promptly killed eight of the red men; the ninth escaped. On the next morning, warned by a timely supernatural voice advising them to get into their ship as fast as they could, they sailed away pursued by large numbers of men in canoes. Thorvald was wounded by an arrow which flew between the gunwale and the shield fixed to the side of the ship. His dying wish was to be given a Christian burial on the Cape. His crew carried out his orders, with a cross at his head, and another at his feet. I have stood on Cape Cod, watching the sailing yachts in that lovely summer-time scene, and I have wondered if one day a chance spade will disinter the Viking who so loved his

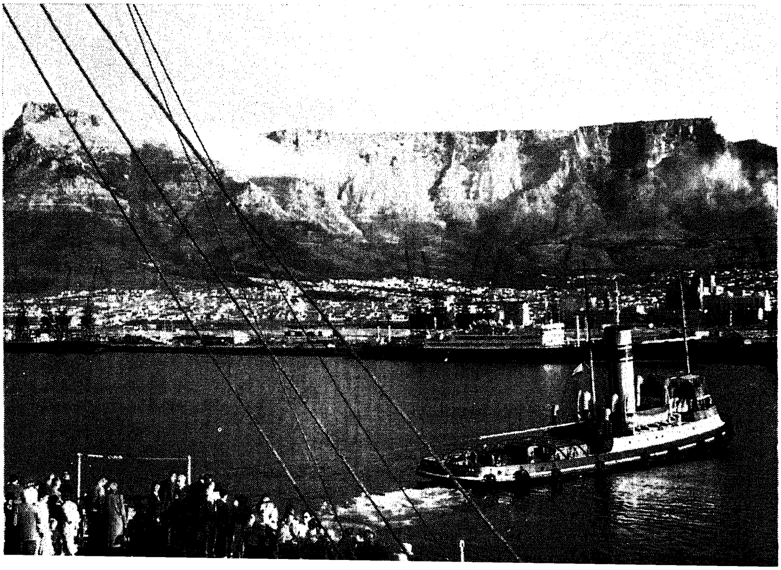
Vinland that he asked to be buried in its earth instead of in the sea—his first love which he had forsworn for his second in death.

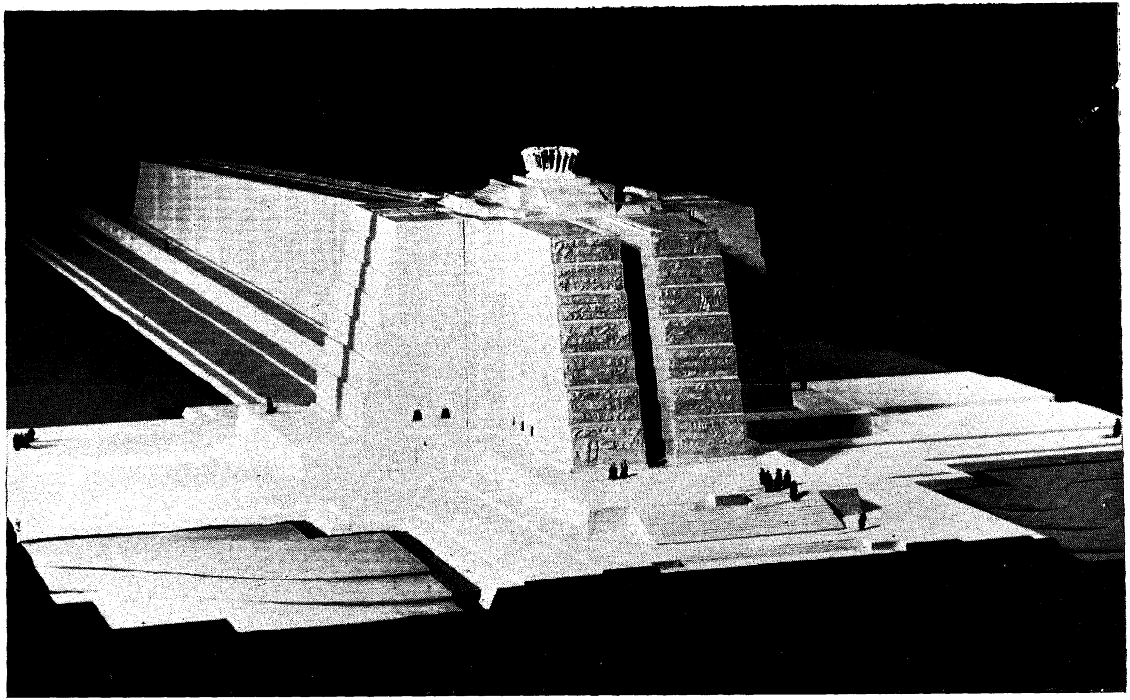
The existence of Vinland was accepted without wonderment from this period throughout the Norse countries. The facts must have been quite well known in Scotland and Ireland, too. Bigger ships sailed Westwards. Karlsefni is said in the sagas to have taken a crew of 160 on his expedition, which skirted the coast of Labrador (where they saw white foxes) to Cape Cod. There were two Scots on his own ship—a man and a woman—taken along because they were famed for their fleetness of foot. Rather callously these two were put ashore and told to make a three-day exploration as far as possible. They came back with cranberries and what they called wheat. The ship then continued in the direction where these Scots had explored and anchored in what was probably Long Island Sound. This expedition included cattle, and a settlement was organized on the shore in preparation for winter. This time there was no mention of a balmy, easy season. They ran out of fodder and were reduced to beachcombing in the hopes of finding dead carcasses—a hope more than realized by the discovery of a dead whale, which made them all very ill. Vinland was not proving the land of milk and honey it was reputed to be. Apart from the climate, the unmarried men began looking at the wives of the married men. One of the party, Thorhall, set off with his crew to go home. Their story strains the credulity, for it was said that a gale blew them Westwards until they were wrecked on the coast of Ireland, though it must in fairness be admitted that Columbus heard stories of castaways on this coast who had come from the West—stories which were common in Irish folklore.

Karlsefni and the remaining members of the expedition sailed South, and in an area which seems to refer to the mouth of the Hudson, they found a pleasanter place for winter quarters. There were meetings with red men who left them alone until the spring when a certain amount of uneasy bartering of cloth for animal skins was conducted. Shortly afterwards large hordes of red men attacked, and there was a bitter



6. The harbour at Las Palmas, Canary Islands





8. Model of the memorial to Columbus under construction near Trujillo, Dominican Republic, where the *Santa Maria* went aground and the first Spanish Colony was located. Surrounded by twenty-one avenues pointing towards the twenty-one nations of the Pan American Union, this gigantic cross has at its centre a light which will be visible for miles out to sea and project an illuminated cross more than 9,000 feet into the sky

battle which influenced the Norsemen to move North again. This expedition was notable because a child was born there during the three-year stay and because there is a reference to the first capture of red men. Two male children were taken from a group found asleep. They were taken back to Greenland and underwent the usual forced baptism. What happened to them is not known.

Soon afterwards accounts of the Norsemen's voyages across the Northern Atlantic cease. In some way the settlements in Greenland were wiped out, either by disease or hostility from Esquimaux, and the power of the Vikings withered away. The Atlantic was once again a deserted ocean on its Western zones for more than a century so far as recorded history goes. The last known voyage to Markland and Vinland by a Norse ship took place in 1347, though there is a circumstantial account of a later voyage by a chief of the Faroes to Greenland and his meeting with a Norse fisherman who had been held captive in Vinland. Still less reliable is the story that Columbus sailed secretly to the New World via the Faroes and Iceland in 1477 in order to confirm the rumours of land he had heard. It is unlikely that he ever travelled farther than the British Isles at that time.

While the power of the Norsemen withered away, Europe stirred from the coma of her Dark Ages, with new knowledge, new hope, and new pride in her destiny, her attitude towards the Atlantic slowly changing. The classical conception of awful chaos somewhere beyond the horizon which gave birth to the enormous waves and storms which made even the coastal waters of Western Europe dangerous was passing. Psychologically it was forced on the people of Europe by the slow and remorseless closing of the gates to the East. While a handful of people in towns like Venice, Florence, Genoa and Rome made fortunes as intermediaries on the East-West trade routes, things were not as easy as they had been while the vestiges of the Greek and Roman Empires lasted or while Christianity penetrated into Asia Minor. The Orient had changed disastrously. During the Fifth Crusade, which petered out as the others had done, there had been a sudden upsurge of relief when Pope Honorius III, in 1221, told the world that a great Christian King named David had taken over the dominion of the Indies and would soon sweep Westwards to crush the Infidels of the Holy Land against the bastions of Western Christendom.

But King David turned out to be Genghis Khan, whose Mongol Empire eventually stretched over half the world. It menaced Europe from the Mediterranean and stretched Eastwards to the sea which the Khan knew was a separate ocean and Europe thought was the Western side of the Atlantic. It stopped only at the Himalayas to the South and edged into the snows of the Arctic. In the closing years of the fourteenth century, Genghis Khan's successors, first Kublai Khan and then Tamberlane, had enslaved half the Old World and spread annihilation among every nation which threatened them, on a scale never before known.

Saladin had conquered Egypt in 1171, thereby controlling the historic caravan routes at all the junctions between East and West. After 1453 the Mongols were looking with greedy eyes on Europe from their newly-captured fortress of Constantinople. To men of vision, modern-minded enough to accept the theory that the world was round, it was obvious enough that power and wealth, moving away from the dangerous East, would find their places in those countries owning the gateways to the West. Those gateways were the estuaries and the harbours of the Atlantic seaboard. Cadiz Lisbon, St. Malo, Bristol—they were all on the threshold of greatness.

The psychological result was a tremendous swing from fear of the unknown terrors of the Atlantic to a longing for its secret delights. Old legends were revived, new ones created. Just over those grey waves were the Islands of Delight, the Seven Cities, the Gardens of Enchantment. Travellers' tales of the early middle ages show an abrupt change of theme, and it may well be that we shall live long enough to see the same thing happen with the current spate of astronomical science fiction. The six-armed little men in their flying saucers, the monsters with ray guns, who currently invade our books from Mars and Venus may well change to blonde charmers living in a stellar Eden. If and when that change comes then probably the first space ship is very close to take-off day. Certainly when men heard stories which tempted them to sail into the Atlantic instead of warning them to keep away, conditions were right to turn dreams into reality, though the Islands of Delight, like Mars, were not in reality quite up to expectations.

Some of the early voyages which preceded the conquest of the Atlantic were merely re-discoveries. The Canaries, seen by the Carthaginians in the fifth century B.C. and explored by the Romans in 25 B.C., were found again in 1270 by Lancelot Malocello. This encouraged the Genoese to send a small expedition down the West coast of Africa on reconnaissance. It set out in 1281 and was never heard of again. Other adventurers set out for vague goals, of whom Jayne Ferrer, who sailed from Majorca in 1346, is typical. He aimed to discover the River of Gold. Notwithstanding the complete failure of his expedition he wrote a glowing account of it, complete with maps. This sort of literary faking was common enough, and makes it difficult to sort the facts from the fiction to-day.

Then came a man who advanced exploration by many a decade. Prince Henry the Navigator was a chair-borne explorer who never took any really practical part in maritime exploration but who, by the single-minded research he conducted from the palace where he lived on the promontory of Cape St. Vincent, made Portugal the great seafaring nation of the fifteenth century. He was as intrigued as any other statesman of his day as to the truth of the rumours of wealth incalculable over the Atlantic, but his underlying purpose was political. He wanted to find a Christian ally in Africa to help his country beat the Moors. He believed that he might find the world-famous Prester John there. His brother Pedro ranged Europe, collecting books, charts, rumours. Henry collected sailors—and ships. The Portuguese caravel was a squat, slow little vessel seldom of more than 200 tons, but it could wallow successfully through very heavy seas. Before Henry died in 1460 a series of Portuguese expeditions had pushed gingerly Southwards, first to Ceuta, then within sight of the lone lines of rocks and the treacherous currents off Cape

Bojador, and in 1445 round Cape Verde. Two years after Henry's death a Portuguese marking stone was set up on the coast of the Gulf of Guinea, and in 1475 Portuguese sailors proved that a ship could cross the Equator without mishap. The sea did not boil; there were no rivers of liquid fire; men were able to breathe. Still slowly and cautiously the Portuguese laid their plans to get farther and farther. In 1487 Bartholomew Diaz set off to extend his voyage to the limit of the African coast. He was caught in a gale and blown right round Africa without at first realizing that storm and wind had brought him unexpected success. He wanted to push on Northwards up the East coast, but his crew mutinied when he was a few miles from Port Elizabeth and he was compelled to put about. He saw the Southern tip of Africa on the return voyage, and named it Cape of Storms. Diaz had conquered one part of the Atlantic, for he had successfully passed through it to another ocean.

Portugal tried to keep her discoveries to herself by secrecy about the results and formal annexation of the new territories. While political, military and religious influences might help to maintain the trading monopoly, the news could not be hidden. It gradually stirred England from her lethargy—so slowly that it was not until Henry VIII ascended the throne that much was done to transform England into a nation of shipbuilders and seamen, and not until Elizabeth took the gamble of challenging all Europe to try to usurp the freedom of the seas that there were tangible results.

This was hardly the fault of the mercantile interests of the country, nor of England's seamen. The country was almost forced into isolation against her will. Until the end of the fifteenth century there were rather tenuous links with Europe through the religious contacts with Rome and through the wool trade. Yet only a small proportion of the wool was exported in English ships. The majority of vessels merely made the easy passage from London to the Netherlands; a few were grudgingly allowed to enter the Baltic and use the wharves of the Hanseatic League. On rare occasions a ship would attempt the dangerous voyage into the Mediterranean as far as the Levant, and there was a fair share of the busy trade to Spain and Portugal. But these voyages bore no relation to the size of the wool trade. People in Russia, India, and throughout Europe, kept warm in English wool. The great trading houses of Italy, the Baltic countries and the Netherlands were the handlers and the principal profit-makers.

Despite the fact that the English government did little to enforce the transport of this valuable export in English ships, there were merchants who dreamed of the wealth that would result from the direct trade with the spice merchants of the East, the fur traders of Russia, and the vintners of Southern Europe. They knew that any concerted attack on the monopolies controlling the exchange would bring about attack on their ships and probably war for their King. The way to the Orient via the East was an impossible gamble. Perhaps the odds would be fewer via the West.

The leaders of this attitude were the merchants and sailing masters of Bristol, the second port of the country. For generations their vessels had been sailing to Iceland to fish and indulge in a little trading. Their captains and crews knew all about the Norse voyages to Vinland. The North-West route offered a definite promise of a destination, though neither the country nor its inhabitants sounded very like the fabulously wealthy citizens of Cathay. The Southern route, on the other hand, was obviously pregnant with promise. Portuguese ships put into Bristol with great frequency, and every captain in the town had at some time or other sailed to Portugal and Spain. It was the most lucrative side of the port's business. In the latter half of the fifteenth century Bristol ships were sailing to Madeira and on occasion to the Azores. In the islands' harbours they met Portuguese seamen who had been much farther South. The whole atmosphere was favourable for hopes of discoveries of their own.

The eagerness led the men of Bristol into the unprofitable paths of speculation on legendary lands in the Atlantic. There were Apple Island, an insular garden of Eden; the lost lands of Lyonesse, and the more factual stories about Antilia and Brasil. In 1480 a ship set out from Bristol to search for Brasil. The sponsor of this expedition was a merchant named John

Jay, and he chose as the captain John Lloyd, one of the best-known of the fifteenth-century mariners who piloted vessels into the Atlantic en route for Portugal during the winter and Iceland in the summer. He was away some four months, but no details are available as to the distance he reached Westwards. Probably he did not go much farther than 100 miles from the Irish coast, where legend stated the island was situated (and where the Roman pottery fragment was found). On modern charts the area 54 deg. North and 12 deg. West is marked as the Porcupine Bank. The depth of water here is around 85 fathoms, about half of the depth of the surrounding sea.

Another will-o'-the-wisp to entice the Bristolians was the Isle of St. Brendan, implicitly believed to exist by most sailors living on the West coast of Britain. It was again a case of facts from the dim past being grafted on to imaginative legend. St. Brendan was an Irish missionary who was alive until 576, and there is tangible proof of his work in the monasteries of Clonfert. He travelled all over Ireland and made many voyages by ship along its coasts. The story of his ocean voyage in search of new peoples to convert seems to indicate that he may have reached Iceland and Greenland, and if the climax of his arrival in the usual earthly paradise is based on fact, he may have got to America as well. The early part of the story is reasonable enough: he saw nothing but "the mighty, intolerable ocean" for some time and then reached an area of ice and icebergs. After that he saw volcanoes throwing out masses of cinders and fire, and near them people of short stature and dark complexion. Those details tie in well enough with Iceland's volcanic zone and Greenland's Esquimaux. The remainder of the story—the great whale on which he camped for the night, the islet where Judas spends an occasional respite from hell, and the fertile land with its great river and grapes as large as apples—may be just folklore . . . or a rose-coloured version of summer-time North America.

Opportunity was knocking at England's door. Bartholomew Columbus tried to interest Henry VII in his brother's idea for a voyage to the Indies. He came to London in 1488, and told his story in vain. The years trickled away, until three ships, in the half-light before dawn of an August morning in 1492, set out on a voyage which was not only to turn the Atlantic into a highway to a New World, but would also destroy the Old World for ever.

CHAPTER III

ACROSS THE SEA TO GUANAHANI

CRISTOBAL COLON is as mysterious a man as the sea he challenged and conquered. Secretive, suspicious, and vain, he has left for posterity a riddle which uncountable words have not satisfactorily solved. Nobody really knows who he was or what inspired him. He may have been a Genoan, a Venetian, a Corsican; he almost certainly had Jewish blood. He may have realized that the world was far bigger than the experts, those bigoted men who always throttle initiative, had proved it to be, or he may have confounded the glory of his life by really chasing after childish fables of gold-plated palaces and rivers of silver. It hardly matters. He changed history in the space of six months, and widened man's mind to a far greater breadth than the thousand leagues of ocean he traversed. He is entitled to the benefits of the view that he knew, better than anyone, what he was doing.

Columbus, as most of the world insists on calling him, did not come under the spell of the sea until he was twenty-three, when he took part in a series of trading cruises from Genoa. By the time he was twenty-five he was dreaming of turning the barrier imposed by the Atlantic into a highway for trade and treasure, and he found rich material for his mind when he landed on the headland where Henry the Navigator had his home—facing the grey Atlantic washing the rocks at Sagres. A year later there is evidence that he had sailed to Iceland, calling at England, which probably meant Bristol, on his way, and hearing the stories they told of Vinland with its cranberries and frost-free winters. To him—a classical scholar well versed in Latin—Iceland was Ultima Thule before he reached it, but merely a stepping stone to that legendary island once he had seen the grey, gaunt land of the North. He came back with a strange story of two shipwrecked persons cast on the coast of Galway, Ireland. They were hanging on to a ship's plank and they had high cheek bones and the narrow eyes of the inhabitants of Cathay. If they ever existed they were presumably Mongolians from Russia or Esquimaux. They could hardly have been Red Indians.

A lesser man might then and there have contrived to interest a Lisbon or Bristol merchant in gambling on an Atlantic voyage for fish, gold, barter or anything else which showed a neat profit. Instead Columbus returned to Lisbon to begin a fantastic effort to turn a foolhardy mercantile gamble into an expedition of supreme political importance. Fifteen years of disappointment, intrigues, research, and always hope, followed before he achieved his ambition.

In this period there is evidence of his activities which completely belies all suggestions that Columbus was the luckiest fortune hunter who ever took to the sea without really knowing what he was doing. Seamen, philosophers, travellers gave him hints of the tremendous truth about the Atlantic. Besides the silly stories of islands which could be seen from the Azores on a clear day and wishful thinking of this kind, trustworthy sailors reported logs and pieces of wood with man-made carvings which they found drifting Eastwards when they stood out into the Atlantic. Though Columbus was hopelessly but forgivably wrong in his calculations of the size of the world—he estimated it to be a quarter smaller than it is—there can be no doubt that he very accurately estimated the size of the Atlantic. His error meant that no such ocean as the Pacific could exist; he estimated that India's shores bordered the other side of the great sea which washed Portugal's coast in a position where, in fact, lay Central America. Columbus made landfall within a matter of a day or two's sailing of the line of longitude where he expected to find the Western edge of the ocean.

The political background which thwarted his ambitions until he was an ageing man of forty-one is a story of Europe rather than of the sea. The year 1492 was a year of sorrow for the people who were almost certainly of Columbus's race. On a spring morning a royal edict ordered the expulsion of all Jews who refused conversion. On the same day another order gave the Jewish-born Columbus his titles as an explorer and a further proclamation demanded that the inhabitants of Palos should put two caravels at his disposal.

While the order against the Jews of Spain was ruthlessly enforced, the Royal command on behalf of Columbus carried no such power. The people of Palos politely listened to the orders when they were explained to them by Columbus at a meeting in the church of St. George, but they did nothing whatever about it. Columbus was not a man who inspired friendship. He had unwisely asked for a clause promising freedom from trial for anyone whose arrest was impending on criminal charges if they would join his expedition—a suggestion of danger which did not encourage the people of Palos to show much voluntary enthusiasm. Apart from kindly encouragement and hospitality from the monks of nearby Rabida, he lived in a state of hopeless frustration. Then he obtained more royal orders of greater insistence. They would not have had the desired result in time for an expedition before the winter but for the help of Alonzo Pinzon, wealthy head of the most important seafaring family in the little town. It was Pinzon who selected the ships and chose the seamen without having to impress the local ne'er-do-wells or prisoners of the local gaol. He knew his men well, and instead of using the force of the royal order as Columbus had tried to do, he hinted at houses of solid gold, rivers whose beds sparkled with diamonds in the translucent water at journey's end, and he gave a token payment on the rewards to come. As the townsfolk were very poor these measures were effective, though real preparation for the voyage did not begin until the end of June. The crews which sailed to the West Indies were free men voluntarily sharing in an enterprise which they regarded as Pinzon's. There were ninety of them, including boys. There were surprisingly no women and, despite the great help given by the monks of La Rabida, no priests. But a further thirty men chose to go on the voyage as supernumeraries: they were non-working members of the crew, personal servants, young aristocrats from the court and a friend or two of Columbus himself.

Pinzon chose one caravel which he is believed to have partly owned. This was *La Pinta* (The Painted Ship), the swiftest of the three vessels of the expedition and about 50 feet long, square-sailed. *La Nina* (The Lass) was smaller and lateen sailed, a local ship of good reputation, thought to be the property of her pilot on the voyage, Pero Alonso Nino. This ship was also the personal selection of Pinzon. The flagship was naturally chosen by Columbus himself, and it is significant that it was the largest: about 230 tons with a forecastle and an after castle, with square sails, and a deck length of 66 feet. However unsuitable it was for transatlantic sailing, it was better than the other two for the length of the voyage Columbus knew lay ahead, and the others did not. Her name was originally *Marigalante,* which in nautical slang might be translated as Naughty Mary. Columbus re-named her *Santa Maria,* though no doubt her crew continued to think of her as a charming and captivating lady with a more worldly connection than her Admiral intended.

Food stores taken on board for a total of one hundred people were considerable. The normal daily ration at the time was about a pound of biscuits, a little over half a pound of salted meat or fish, two litres of wine, with cheese and onions as substitutes for the meat. Heavy cannon balls and water were used as ballast, and the stores were sufficient for a minimum of six months. From the diary details it would appear that cautious Columbus himself took enough for a year. In addition to incidental stores such as fuel and clothing, he took cheap trading goods of the kind successfully bartered on the African coast—strange merchandise if he really considered that his goal was a highly civilized Cathay with cities of gleaming marble bridges, gold-inlaid palaces and great mercantile houses.

On August 2, 1492, Columbus, now very much the master of the expedition, ordered all aboard. To his officers and men it must have seemed a strange move, for they knew that he did not intend to set sail until the following day. But August 2 was the day when the last Jewish refugees were compelled to sail away from Spain. In all the ports of the country the terror-stricken, wailing persecuted people who had refused to give up the religion of their fathers embarked for they knew not where. The deeply religious Christian who was Columbus made this noble gesture to his race. He too left Spanish soil on that day of desolation. He too was embarking on a journey which was an Exodus to an unknown destination.

The scene as the false dawn of August 3 put the sails of the little ships in silhouette against the barren lands behind cannot be re-created to-day. Palos is now a rather shabby little village (though direct descendants of the Pinzon can help to take the visitor back nearly five hundred years in a word and a gesture) lying under the protection of sandbanks which have formed since Columbus's day. The lagoon which made such an easy anchorage while the ships were loaded is almost completely silted up.

Without fuss, but with all the wives and children trying to discern through the half-light what was happening, as the South-East breeze of the August morning filled the sails with their great crosses of Christendom curving outwards, the ships dropped down river, the Rio Tinto, past the jetty which still stands in much the same place at Rabida, past the lonely monastery on the promontory where the monks were already far through their prayers for God's blessing on their good friend's enterprise, past the last earth of the Old World, tinged rosy red on its land side of the rising sun, and out into the Atlantic.

The ships were by no means the best available at the time for such a voyage. Although the lateen sail invented by the Arabs had been well-known in the Mediterranean for more than five centuries, Columbus preferred the square sail for the sake of speed, risking disaster if he met contrary winds. The best that can be said for Columbus's vessels is that their buoyancy was excellent provided the hull could stand the strain. The exact replicas of his ships which were built in 1893 to sail over the same route in connection with the World's Fair at Chicago caused great alarm to the crews when they met head seas. Captain Concas in command of the modern *Santa*

Maria, considered that more than two days of bad weather would have brought the masts down and split the hull.

The précis of Columbus's journal which Las Casas gave is too well-known to justify repetition here; its fascination is more in what he left unsaid than what he said. One suspects that much was omitted by Las Casas because it did not appear of interest: he preferred the accounts of birds, driftwood, and other alleged portents of approaching land to the scientific data which the greatest navigator of his age must surely have set down. He was the first to put theory into practice. Hitherto the Portuguese explorers, though they had opened up thousands of miles of territory, dreaded to be far away from land; they hove to at night. Columbus challenged the lonely wastes of the sea and relied on science to take him through them. He sailed by the stars at night, and by the sun by day. The years-long study of charts had influenced him to decide on the 28th parallel as the invisible route which he would follow. He had no means of exactly judging his speed or his drift, but he maintained his route with really remarkable exactitude. It took him along the edge of the North-East Trades just as on the return voyage he chose a more Northerly route with the prevailing Westerlies bowling him along. His gamble of square-rigged sails for the sake of speed would have been disastrous if he had made directly for the Azores instead of dropping South-Westwards to the Canaries. Such a decision can hardly have been mere luck. Columbus found the West Indies. Almost as important, he found a two-way highway across the Atlantic which made communication reliable for the following three hundred and fifty years.

The momentous period which changed world history began on October 7, 1492, when the presence of land showed itself in the banking clouds to the West, the scent in the calm air, and the still green foliage on branches and twigs in the water. On that day a cannon boomed out from *La Nina,* but the signal of land was false. More days and nights passed. The signs of land increased, but still there was no land. Then, shortly before midnight on October 11 the restless and sleepless Columbus, standing on the sterncastle, saw a light. His steward saw it. Others saw nothing.

Many theories have been put forward as to the source of this light. Columbus thought it was a lamp being raised and lowered. The moon at the time had not risen, so reflection from a moving object was unlikely. Modern marine biologists have suggested that the source might be luminous syllids which are active at night. The difficulty is to reconcile this theory with a pin-point of light moving up and down, and there is also the unsatisfactory factor, if this theory of natural luminescence is accepted, of the light source failing to help to identify where Columbus was. It seems quite possible that the light was of human origin. It could have been on a native craft, used as a lure to catch fish and hastily changed to a signalling apparatus when the occupants saw the bulk of the *Santa Maria* and her sisters, or equally a signalling lamp on the shore where again warning might have been made of the approach of large and strange vessels. If the light was man-made then Columbus was at last fairly near an island, invisible in the moonless period concerned.

After seeing the light, two hours' steady sailing was completed. At 2 a.m. on the Friday morning (October 21 in the Gregorian calendar) the moon had risen and from the prow of the *Pinta* came a shout. The look-out Rodrigo Sanchez de Triana, had sighted land. He should have been rewarded with a silk doublet from Columbus and 10,000 maravedis from his King and Queen. He never received either.

Down came the sails, and the ships waited for dawn. In the light of the rising sun the excited crews looked on the New World. Parrots squawked in the bushes. The breeze sighed in the foliage of the stunted trees. A few brown-skinned and naked men stared with childlike curiosity at the ships.

Anyone retiring to the islands of the Caribbean can find a hobby for the rest of his life in trying to identify this momentous landmark in world history, and to trace the route Columbus followed afterwards. The enthusiast for such mysteries will probably be tempted to create a *Deus ex machina* in the shape of an earthquake to solve the problem, for no existing island really dovetails with the facts given by Columbus in his log. He will probably doubt whether the usually accepted island, Watling, is the right one. It is only fourteen miles long and can hardly be called "very large" from whatever angle land-hungry explorers view it. Columbus talked of a hill, a lagoon, woods, and a separate islet. Watling is low-lying and the only feature which might have been taken for an islet is a small peninsula.

The mysterious light is an important clue. This may have been on Watling Island or a canoe sailing close to it, and then Columbus's San Salvadore, as he named his first discovery, is either Cat Island or the very small Conception Island. Cat is reasonably large, covering more than 450 square miles, and its 400-ft. high hill is the largest in the islands of the area. It has a number of lagoons, but these could of course have emerged during the past four centuries. Conception is tiny—a mere islet of three miles in length and two in width, but it has a lagoon and there is a small islet on the North-East side.

If the Columbus landfall was Cat Island then it is remarkable that he missed Conception on the following day when he sailed within a thousand yards of it. Conception fits well as regards the light on Watling to the East of it, and with the islands he saw subsequently, but the description of the geographical features which Columbus made is strangely inaccurate.

The other islands which have been suggested as the site cannot be really justified by the available data. For the record they are Rum Cay, a tiny islet; Grand Turk Island, Atwood's Cay, and Mayaguana.

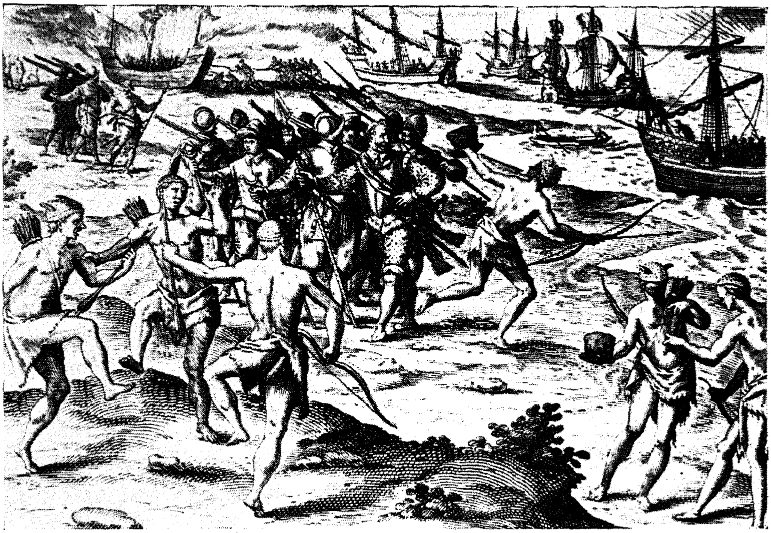
If the amateur investigator ignores all difficulties, accepting Watling Island as the authentic gateway to the New World, then he must regret that the name of the place commemorates an undistinguished privateer instead of being named San Salvadore as Columbus intended—or better still, Guanahani, as its gentle and doomed inhabitants called it before progress destroyed them.

On that first morning they could not know what lay in store. Unhurriedly Columbus prepared for his landing. The natives stared with mild interest at the magnificent being who walked ashore. He was dressed in full array and held a Royal banner. Behind him came the Pinzon brothers, bearing the standards of Christendom and of Ferdinand and Isabel. The uncomprehending natives listened politely while Columbus formally announced that he was taking their land from them. Behind the rather ridiculous and pompous group stood an armed guard. When the rigmarole which the Americans took to be some magical ritual was over they eagerly came forward to greet their new friends. They liked the beads and bells they were given. They admired the shining sticks that glinted in the sun. One caressed such a stick. He was allowed to grasp it for himself. When he withdrew his hand it was bleeding. The power of the Old World's sword had tested itself on the unresistant flesh of the people of the New. They were to learn much more of its bite in the years to come.

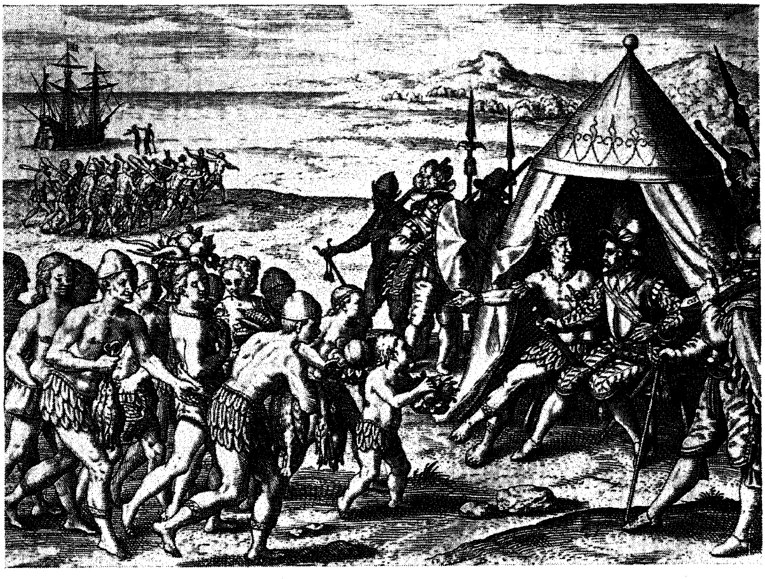
Next day Columbus set off in search of the mainland. The expedition became intoxicated with the profundity of discovery. Island after island swung past his gently moving ships. The voyage became leisurely. Columbus was in no haste to return; he was under the thrall of the islands in this most beautiful of seas. By December 5 he had reached the island of La Espanola, which he later re-named Santa Domingo, and on the 12th he landed to plant a cross "as a sign that your Highnesses possess the land as your own, and principally for a sign of Jesus Christ our Lord and the honour of Christianity".

Here the *Santa Maria* drifted ashore and was abandoned on Christmas Day. The other ships were put in hand for repair. Living quarters were built ashore. To-day, on the reputed site of the Columbus colony, a great memorial is being built. Designed in the shape of an enormous crucifix, a central lantern will project light through twenty-one channels representing the republics of the Pan-American Union. At night this glare in the sky, in the shape of a Cross, will symbolize the banner of the great explorer.

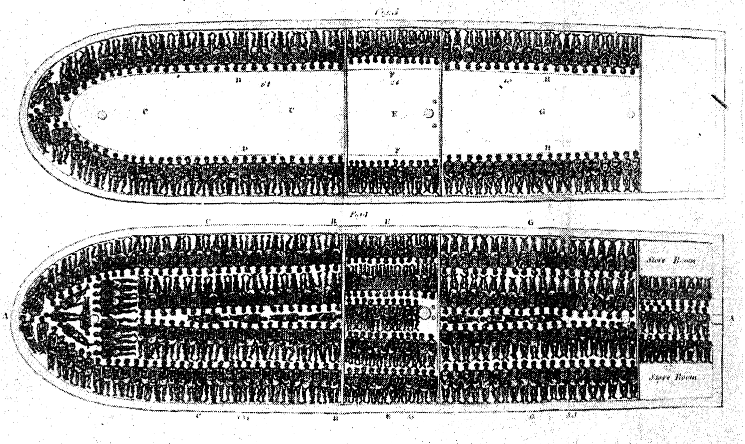
It was from this area that Columbus set off on the return. The storms sent the crews to their knees with fervid promises of religious pilgrimages when and if they got home safely. Yet the journey was really as well blessed with fortune as the outward passage. The ships began moving from the Carib-



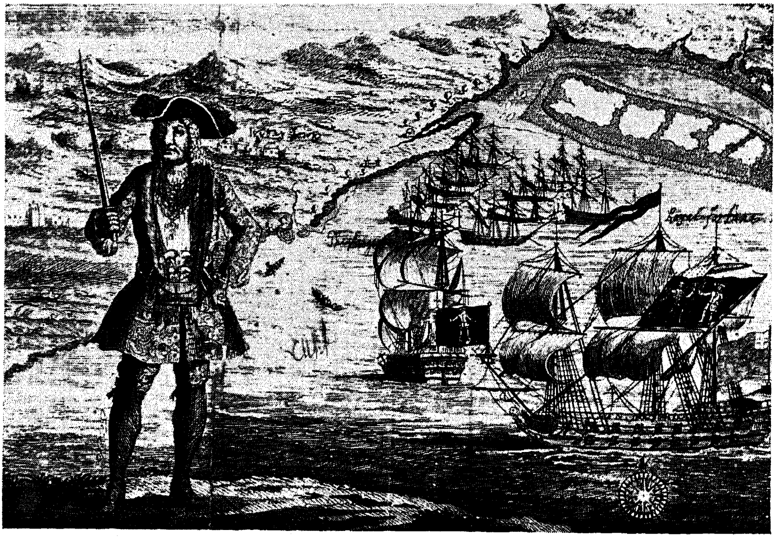
9. Illustration of popular sixteenth century story about Sir Francis Drake's adventures on his Atlantic expeditions—natives snatch his hat when he lands at the mouth of the River Plate. From de Bry's *Voyages* (1599)



10. "Sir Walter Ralegh making friends with the King of Arromaia"—engravings of this type were the means of heightening interest in the lands and peoples of the New World. The picture is taken from de Bry's *Voyages* (1599)



11. The stowage plan on two decks of a slave trader in 1790. The vessel, of 320 tons burden, had an overall length of 100 feet and a beam of 25 feet 4 inches. Into this space 454 men and women were shackled. The sketch was produced during evidence for the Wilberforce campaign against the slave trade



12. A typical Atlantic pirate of the early eighteenth century: Captain Bartholomew Roberts with his two privateers, the *Royal Fortune* and *Ranger*, standing guard over eleven captured vessels on the Guinea coast. Reproduction of a plate in *General History of the Pyrates* (Second edition 1725)

bean to the Atlantic on January 4, 1493, reached the Azores on February 18, and dropped anchor in the Tagus on March 4. The *Nina* completed the round voyage when she eased slowly over the Saltes Bar on a flowing tide and anchored in her home port at noon. The clamouring relatives and friends learned that forty men had been left in the New World, that the flagship was rotting on its shores, and that the *Pinta* had sought refuge in the port of Bayona to the North but would make her way home in due time. It was an unbelievably happy ending to the story for the people of Palos, by then convinced that the ocean had swallowed up their sons and husbands.

From the human reactions of the simple people who had been thrust into greatness (and were as quickly forgotten) the picture developed until the whole of Europe was in a turmoil. For the flourishing cities of Venice and Genoa the news of the transatlantic crossing was disastrous. For the religio-political centre of the world it caused quarrels as to who by divine right owned what—and the facile solution of drawing a vertical line on an inaccurate world map had to be changed at intervals for long after. But to the seamen and the merchants outside the monopolies it was a picture of infinite hope. The longshoreman was ready to become an ocean navigator. Mercantile interests looked West instead of East. Columbus did not believe in understatement about the glories of the lands he discovered. There was a pot of gold at the end of his rainbow, and an even bigger one just beyond that. From 1493 onwards there was never a month when the Atlantic knew desolation. Somewhere ships were probing South, North and West.

While Columbus made three more voyages which were largely repetitions of his first one, other explorers searched on each side of the narrow lane he had used. While Vasco da Gama, with twelve chained men in the holds for scouting on land, and 170 picked men in his crews set off in July 1497 for a successful voyage to India, a group of English sailors under a Venetian were nearing home after reaching North America. His name was John Cabot.

The details of England's contributions to early Atlantic exploration would be better if almost all the records of John

Cabot had not been lost. A widely travelled man—he had visited Mecca—it seems obvious that he chose Bristol for his enterprise because of the known experiences of ocean sailing there. His purpose was trade. According to a Milanese in London, the "low class Venetian" Cabot sailed with 18 others, passed Ireland (whether to the North or South is not known) and then steered North-Westerly. After "wandering considerably" he found rich fishing grounds and then a well-wooded shore.

Cabot's ship was called the *Matthew,* and though English merchantmen of 400 tons existed at this time, she was probably of less than 200 tons, less than 85 feet long, carrack-built, and fitted with a slightly raised poop and forecastle, and possibly was three-masted. The *Matthew* can be regarded as a better ship than those of the Portuguese and Spanish for ocean exploration, because it was more robustly constructed. All English ships at the time were potential warships, liable to be commandeered in an emergency and built to take cannon.

Cabot appears to have been about fifty days on the voyage to the Northern tip of Cape Breton Island. His son Sebastian's evidence suggests that no other land was seen en route, so that he did not swing North to follow the old Norse route via Iceland and Greenland. Cabot estimated the distance from Bristol to his landfall in the New World as 2,100 miles, and he was three months on the round voyage. Like Columbus he was lucky in the weather, for he optimistically observed after two experiences of mid-Atlantic weather that storms were never met with after Ireland had been left behind. For the direct run he thought that fifteen days would suffice, possibly a statement coloured by the desire to encourage the faint-hearted to finance further expeditions.

He coasted down the Atlantic seaboard for about 900 miles after planting the Cross of St. George for England and the Cross of St. Mark for Venice on the soil of Cape Breton. His reward was a formal sum of £10 given by Henry VII merely to recognize Cabot's claim to success. The more valued rewards were a retainer so that he and his family could live in style in Bristol, and a promise of ten ships manned by prisoners for another voyage in the following spring. Henry was already dreaming of a London eclipsing Alexandria as the world's centre for the spice trade. Both he and Cabot implicitly believed that England's banner had been planted on the coast of Asia. Henry made no attempt to claim the land for England as a colony or dominion.

Cabot had not underrated the enterprise of the seamen of Bristol. So far from having to employ convicts he was pursued, as the Milanese diplomat reported, " by English who run after him like madmen so that he can engage as many as he pleases ".

The ten ships became five, one a merchant ship from the Port of London, and the other four Bristol vessels. Nothing is known of the results, though one story suggests that the flagship foundered on the return voyage, and Cabot went down with it. Maps made afterwards infer that before this disaster Cabot took his ships down the coast as far as Chesapeake Bay. Though at the time the reaction to John Cabot's voyages was one of disappointment—he had found no flourishing peoples eager for barter and no route to the Indies and the spice merchants—he did in fact lay the foundation of future prosperity and greatness for his adopted country. He opened the way to the rich fishing grounds of the North-West and he inspired the search for the North-West passage —and the annexation of North American lands.

His son Sebastian carried on in the direction where his father had pointed. He probably sailed deep into Hudson Bay and provided the sailing pattern which sent Martin Frobisher to the North-West in 1576 and encouraged Willoughby and Chancellor in 1553 to seek an alternative route to Asia North-Eastwards. But before those voyages the turmoil which Columbus had created in world politics was inexorably drawing the Old World into war. In England Henry VIII was sponsoring a programme of shipbuilding such as the nation had never known since the days of the only earlier king who had realized the value of sea power—Alfred the Great. At Woolwich, Deptford and Portsmouth, skilled shipwrights from many nations taught English artisans how to fashion English oak into great and powerful ships. Henry started the organization which became the Board of Admiralty, and by his charter to Trinity House in 1514 put the merchant navy on a proper footing.

In fishing villages of the West Country boys were growing up in an environment redolent with adventure. They saw the great new ships which were loading at Plymouth, Bristol and Falmouth. They heard of the still bigger vessels under construction in the ports of Spain and Portugal. They were told about the Spanish Main—the great seaway carved across the Atlantic as a private thoroughfare for the stream of wealth which poured in one direction month after month. They grew up, ready when a proud, temperamental and cunning Queen condoned it, to challenge that supremacy. An ocean was quickly changing from an unexplored waste into an arena of battle.

CHAPTER V

THE SHIPS SPREAD OUT

TENUOUS threads stretched across the ocean. On the East they converged at the Iberian Peninsula. In the new continent they spread out at their termination to touch the 500-miles waist of the Americas. The new and exciting world maps gave tantalizing promises to sailors. Whatever shape and size the new lands were drawn, there was the whole Atlantic by which to reach them, and at either end there must surely be a watery way round to the elusive Indies. Catholic Spain and Portugal might have this ocean by divine ordinance, but Reformation nations could challenge that privilege without fear of retribution in a later life, and, by avoiding the routes of the Iberian ships, without danger in this one.

For nearly a century the Spaniards and Portuguese guarded their sea lanes over the Atlantic with varying degrees of success. The navigational lore they collated on the seasons and their weather was kept secret. The Spaniards knew better than anyone how to follow the North Equatorial Current when outward bound and to use the Gulf Stream when on the homeward passage. The Portuguese seamanship overcame the difficult current and wind conditions on the Southerly routes. Their maps quickly improved, largely due to the work of Kremer, a Belgian appointed Court cartographer to Spain, whose Mercator's Projection first appeared in 1537.

New Spain became the magnet to every adventurous young aristocrat of Castile. Alonso de Hojeda, a soldier of fortune, was one of the gentlemen who sailed with Columbus on his second voyage. He came back full of the story about the gold-encrusted monarch who reigned as El Dorado, and he was given permission to explore in South America, well away from the territory opened up by Columbus. His importance in Atlantic history is that on his expedition in 1499 he took with him an Italian-born clerk named Amerigo Vespucci. This young man, whose subsequent accounts of his wanderings were somewhat imaginative, penetrated South as far as the Argentine in 1501-2, and a letter from him suggested the name of America for the new continent. But there is also some evidence that in Bristol the continent was by then known as Ameryk, named in honour of the Sheriff of the town, Richard Ameryk, who had supported Cabot in his first expedition. Another suggestion is that Vincente Yanez Pinzon adopted the Breton name for Far West, Amorique, as the name of the country he explored largely for his own amusement and esteem. Pinzon's place in the early pages of Atlantic exploration is possibly more justified by his action in bringing back to Europe a monstrous little animal with a furry pouch on its belly. The year was 1500, and a Spanish Court already bored with stories of golden men and silver cities was stirred to amazement by the sight of an opossum. The bizarre creature lent glamour to the strange New World which was Spain's —and Spain's alone.

It was reasonable enough that Spain, bloated with the riches of her new conquests, should be content with the traversing of the narrow band of water between herself and the area of Columbus's original discovery. From opossums to bullion, the system provided all that the mind of man could encompass. The Portuguese, through Papal decree and their own determination to reach the Indies by an Easterly route, were effectively baulked from Western exploration. If her sailors wanted to probe West it had to be under Spanish control. Thus Fernao de Magalhaes, (Magellan), a Portuguese, was allowed to sail for Spain in 1519 from Palos with five ships, the largest being *San Antonio*, 120 tons. There was mild excitement about an expedition which intended to look for a Southerly route to the Indies. Magellan hoped to take an astrologer with him, but that worthy, with the casting of a horoscope just before sailing time, was so desolated at his findings that he hastily decided to remain at home. His forebodings were not unjustified. Before the treacherous murder of Magellan in the Philippines he had achieved another victory by man over the sea when he battled his way round the Horn, naming the frightening and desolate bastion between two oceans by the charming name of Cape of the Eleven Thousand Virgins.

Apart from a few exploratory voyages like Magellan's, Spain dropped from the exploring scene. Her supremacy on the existing routes was the motive which influenced other nations to seek other paths. Jacques Cartier, first of a long line of seamen who set out from St. Malo to North America, sailed well to the North of Spain's route and took his little ship *Grande Ermine* into the Gulf of St. Lawrence, meeting natives in the river mouth who told him that they called their land Camatha.

Across the Channel from St. Malo was the old seaport later to give its name to settlements in many parts of the New World, and to become the major European stepping-off place for Atlantic travel. Plymouth had not, till then, the importance of other English harbours. Its growth increased phenomenally when relations with Spain deteriorated, because of its perfect position for a naval station protecting the English Channel.

One wealthy and important family of Plymouth, which had come there from Kent, was headed by William Hawkins, appointed by Henry VIII as Master of the Great Galley in 1513. He was given the office not on account of court or political influence, but as one of the wisest and experienced sea captains in Western England. He made three voyages to America, the first in 1528, when he fitted out at his own expense the *Paule of Plimmouth*, the first wholly English expedition across the Atlantic. His voyage was not one of exploration so much as trade, and he made large profits from merchandise brought back from both West Africa and Brazil. The fact that he was ready to barter honestly and had no wish to loot or wage battle produced a ready reaction from the people in both lands, so much so that a chieftain of a Brazilian tribe agreed to return with him on his second expedition.

This visitor, the first from the New World to England, was a fearsome gentleman with bones inserted in his cheeks to give the appearance of tusks (a badge of valour) and a large jewel embedded in his lower lip. He was fêted at Henry's court in Whitehall and thoroughly enjoyed his year's stay in England. Unfortunately he died on the return passage to Brazil and was buried at sea. It conforms the reports of good relations of Hawkins with the Brazilians in that they accepted his story and took no action against the hostage they held to ensure the safe return of their chieftain. This hostage, incidentally, was Martin Cockeram, one of the crew which sailed with Sebastian Cabot on his first expedition to America.

Hawkins eventually became Mayor of Plymouth, settled down and raised a family. The most famous of his sons, John, became chief naval adviser to Queen Elizabeth. From his boyhood he sailed in his father's ships, usually on trading trips to the Canaries. With his brother, William, he later ran privateers, and both were wealthy men before their father died in 1553.

John Hawkins organized the first important Atlantic trading voyage of the Elizabethan era in 1562. It was a slaving enterprise. Both the commercial success and the political results set the scene for the next sixty years. He did well with his African slaves, changing them for a great cargo of hides. These were sent to an English merchant in Cadiz for sale, whereupon Philip of Spain, possibly through religious zeal, but more probably because of the significance of the infringement of his monopoly, seized the hides as contraband and sent a message to his Governor in Hispaniola notifying him that the slaves were forfeit to the Crown. Queen Elizabeth was informed of what had happened, and characteristically, on Hawkins's next voyage, she became his partner and allowed him to take a flotilla to guard his ship, the *Jesus of Lubeck*. Not only did he sell his slaves in the face of Philip's veto, but he also leisurely surveyed the coastal waters of Spain's New World possessions for hundreds of miles in the Gulf of Mexico. The enterprise paid a dividend of 60 per cent. The Queen rewarded him with the office of Admiral of the Queen's ships at Plymouth and gave him the *Jesus* as his flagship.

Hawkins almost immediately upset Spain still more by ordering a Spanish galleon, en route to Flanders to fetch Philip's bride, Anne of Austria, to dip her flag when passing Plymouth. The commander did not comply, and received a fusillade from Hawkins's little fleet for his rudeness. One result of this defiant gesture was that the next adventure to the West Indies was a failure. The infuriated Philip's orders to refuse trade with the Hawkins firm were this time obeyed. On board as second-in-command on that occasion was Francis Drake, 23 years old, who had been apprenticed to coastal trading ships nine years before.

Hawkins offered Drake a ship in his next expedition, the disastrous one of 1567. The enterprise had two ships loaned by the Queen, three supplied by the Hawkins family, and Drake with the *Judith*, 50 tons, the best he could buy with all his savings. They roamed about the Atlantic from October, 1567, until June of the following year, capturing a Portuguese caravel which had just before that been taken by a French privateer. Drake was put in command of this ship until the little fleet was off the Rio de Hacha, when Hawkins sent Drake on ahead in the *Judith*, accompanied by another cockleshell, the *Angel*. The Spanish fort promptly opened fire. Drake withdrew to blockade the port and had the good fortune almost immediately to capture an incoming Spanish despatch ship. The whole coast was by now in a state of alert. The Spaniards won by treachery. At San Juan de Ulloa, Vera Cruz, Hawkins was tricked into entering an ostensibly friendly harbour. He was then trapped and all the cannon on ships and land opened fire. The English ships retaliated with venom and destroyed every Spanish vessel, but they were powerless against the forts. Only two ships were seaworthy when they managed to get away: the Queen's *Minion* and Drake's *Judith*. Half of the crews were killed or captured, and the remaining 200 could not be fed on the passage home, so one hundred were left on the Florida coast until a rescue ship could be sent.

Drake was not, by the evidence of his career, particularly amenable to discipline. He tended to act first and think afterwards—a trait which at times saved England. But why he left Hawkins under cover of darkness after that disaster at Vera Cruz is a mystery; what he did between that time and his arrival at Plymouth four months later will never be known. Over-manned, under-provisioned, already a year away from his home port, the *Judith* could have crossed the Atlantic in 4-5 weeks. She took 16. Drake never revealed what had happened. Probably he tried vainly to retrieve the financial loss of the expedition by privateering, failed, and kept quiet about it. Hawkins in the *Minion* staggered as far as Penzance with fifteen survivors, with hardly any food or water left.

For some time afterwards the Hawkins family satisfied its desire for revenge on the Spaniards by joining the privateers who harried every Spanish ship in the Western Approaches and the English Channel. The privateer fleets of Dutch, Flemish and English ships numbered at least a hundred at this time. Hawkins also had to get his men from Florida, where many of them were prisoners of the Spanish. He managed this by masterly cunning, selling his ships to Spain for £40,000 and the return of his men.

Drake made another secretive voyage in 1569-70, taking two small ships to the Spanish Main, and in 1571 he planned his third voyage, preparing for his fantastic one-man war against the Spanish colonies. On Whit Saturday, 1572, he was ready. He had two ships for transport of men and material for what was to be the first invasion of a European colony on the American continent. They were the *Pascha,* 70 tons (Drake's flagship), and the *Swanne,* 25 tons, commanded by his brother John. In the crews was one veteran of fifty, but the remaining 72 members were all under thirty, many of them boys. Drake took landing craft with him, sections of pinnaces stowed on deck. The exploits of that expedition rang round the world. It included the assault on Nombre de Dios. When he returned on a Sunday morning in August 1573, at Plymouth, the city officials and the people hurriedly left St. Andrew's church for the Hoe to welcome him. The treachery of San Juan de Ulloa had been avenged.

On November 13, 1577, five ships stood at anchor in the Cattewater at Plymouth. Last-minute preparations were being completed for an expedition which, ostensibly organized for a trading voyage through the Mediterranean to Alexandria, was in fact to be a private invasion by Drake of the Pacific. Queen Elizabeth was a shareholder in the enterprise, providing one thousand crowns of her own money and some Navy ships. The biggest vessel was Drake's *Pelican* (re-named on the voyage *Golden Hind*), the smallest, the *Benedict*, 15 tons. That epic voyage did many things for English and maritime history. It marked the occasion when the first Englishman crossed one ocean and entered another. It proved to one explorer, though for centuries no one really believed him, that even if there was a North-West Passage it was too far North to be navigable; when Drake, then alone in the *Golden Hind*, reached as far as Vancouver Island and saw the coast still looming West of North, he realized that he could do one of two things: risk losing his ship and treasure by running the gauntlet of Spain round the Horn, or sail round the world. After more than two years his vessel once again ploughed into Atlantic waters off the Cape of Good Hope. He sailed steadily North, stopping only at Sierra Leone, and anchored in the lee of Drake's Island of Plymouth Sound, two-and-three-quarter years after he had set out.

His first question to a passing fishing smack was "Is the Queen alive and well?" Although Plymouth—like all England—was gripped by plague, his Sovereign was in good health, though not a little worried at the political troubles which El Dragon's activities in Spain's colonial waters had engendered. Philip of Spain solved the problem for her by landing troops in Ireland, this giving a good excuse to sever diplomatic relations. At the same time she had Drake's report of the financial advantages which had accrued. The *Golden Hind* had fished well indeed. Her haul was worth about £2,000,000 in modern money, of which Drake took some £65,000, the Queen half (as stipulated by her investment), and the remainder was stored away in Plymouth Castle. Philip wanted the world voyager's head—a fact the Queen mentioned as she took a sword of gold and lightly struck him on the shoulder to confer his knighthood.

Just before Drake set off on his world voyage via the Horn, a theoretical work on the existence of a passage to the North of America was issued. This was the work of Humphrey Gilbert, half-brother of Walter Ralegh, and a scholar of exceptional brilliance even for that brilliant era. In the same year that the *Pelican* sailed away Gilbert had suggested to the Queen an ingenious plan for fitting out a war fleet for the ostensible purpose of global exploration, but actually, when it had crossed the Atlantic, to swoop on the Spanish guard ships and settlements, destroy them and proclaim the territory an English possession. Possibly the capricious and parsimonious Queen was at first tempted by the idea, but finally favoured Drake's more economical and less aggravating enterprise.

Gilbert, thwarted on this plan, thereupon obtained permission to organize voyages for discovery and colonization in the North-West. Ralegh helped in the organization of the expedition which sailed from Dartmouth in November, 1578. A Spanish attack off Cape Verde drove him home and for five years he was in desperate straits, complaining to an unfeeling court that he had been compelled to sell the clothes off his wife's back. He never ceased to hope, and looked in new fields for financial aid. He found it among some merchants of Southampton, and in June, 1583, he sailed from Plymouth in five vessels. One, the *Ralegh*, put back after a few days. The rest reached the North coast of Newfoundland after a passage of seven weeks, and on August 5 he landed at St. John, formally inaugurating the first British colony in America. Gilbert remained there for only a fortnight, largely because his crews demanded to go home and he, being a poor disciplinarian, had reluctantly to agree. One ship sailed due East, while Gilbert continued coastal exploration. A second ship was wrecked, and two days afterwards, the survivors, the *Squirrel* of 10 tons, and the *Goldern Hind*, headed for home. The subsequent tragedy is, of course, part of maritime history. A September gale pulverized the little *Squirrel*, and she went down with Gilbert reading a book as he crouched in the stern. He had earlier refused to transfer to the larger *Goldern Hind*, saying "We are as near to Heaven by sea as by land". He did not die in vain. Not only had he founded the British Empire, but in his unique position as a scholar-seafarer he had shown that the New World offered not only loot and adventure but also chances of colonization and political expansion.

The more conventional spur of sudden wealth impelled other great Elizabethan sailors of the North Atlantic. Martin Frobisher was one of the men who sailed regularly on trading voyages to the Guinea coast and the Levant organized by Sir John Lock. These expeditions took place once a year, and, when time allowed, Frobisher indulged in privateering, sometimes without the niceties of permit, so that his maraudings were regarded as piracy. He went to prison as a result.

The Elizabethan genius for harnessing such a man for the country's good resulted in Frobisher being put in charge of patrols in the Irish Sea. At this time he read and was greatly impressed by Sir Humphrey Gilbert's "proof" of the existence of the North-West Passage. With Elizabeth's blessing and a permit from the Muscovy Company, Frobisher made three attempts—in 1576-7-8—to find it. He penetrated beyond the Northern edge of the Atlantic in his ships, the largest of which was 20 tons. When he reached the bay that is now named after him he believed that he had discovered the straits to Cathay, and more than that: mountains of gold. There were assayers in London who were prepared to agree that the worthless ore he brought back was indeed gold-bearing, and more who denied it.

Frobisher's only trophies from his voyages were some Esquimaux and the tusk of a narwhal (which was regarded as a unicorn's). This gained him some recognition from Elizabeth when he presented it to her for its magical properties. Thereafter his maritime life was spent in the Navy. He sailed under Drake to the West Indies, commanded the largest ship in the battle against the Armada, and was mortally wounded at sea in 1594.

Where Frobisher had shown the way, John Davis, a Devonshire man, followed in 1585. He was more successful as an explorer. He re-discovered Greenland, and on a later voyage passed through the Strait named after him, reaching the 73rd parallel. Impressed by the midnight sun, he believed—and wrote—that the currents in the Arctic Circle he had found prevented the sea freezing, and that on the site of the Pole there was a balmy climate enjoyed by a race of supermen. It was the sort of wishful thinking that found ready ears, and marked another stage in the long story of the attempt to find the North-West Passage. The threads from the British Isles to the West were multiplying fast; they were thickest in the North. Then, in the last decade of the century, one man answered the call of oriental riches by sailing South.

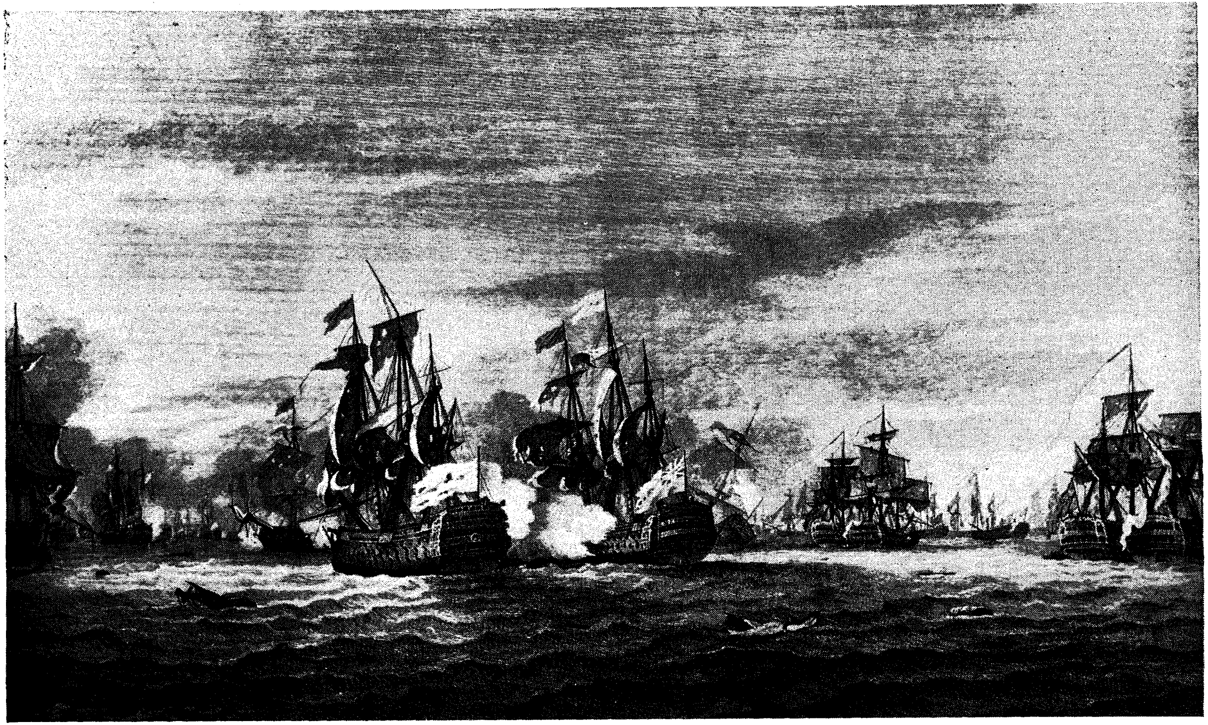
England's colonial expansion in Asia was due to the voyages of James Lancaster. He was an Englishman who had lived from early boyhood in Portugal and in later years sailed on ships round the Cape of Good Hope to India. With the growth of international tension the Portuguese got rid of Lancaster, no doubt considering that it was risky to have an Englishman sailing and learning their routes. They could not, of course, destroy the knowledge he had gained, and after fighting against the Armada he was chosen by the London merchants to take charge of an expedition to the East Indies. He sailed on April 10, 1591, in the ship he had commanded in the Armada battle—*Edward Bonaventure*. Two other ships accompanied him. The first disaster was to get becalmed South of the Cape Verde Islands. The crews would have starved but for the fortunate capture of a Portuguese ship well stocked with food and wine. Lancaster's knowledge of the East Indian route was evidently not particularly good for after he got out of the Doldrums he allowed himself to be driven far off course by contrary winds. After five months at sea the ships were still North-West of the Cape, and one vessel had to be sent home with fifty of the most serious sick cases.

Soon afterwards the second ship was sunk in a storm and the *Bonaventure* was struck by lightning. Despite heavy casualties, Lancaster went on. Eight months after leaving Plymouth he reached Ceylon. Success in privateering leavened the continuing tale of disaster, but the crew mutinied and forced Lancaster to sail for home. Back in the Atlantic he made for St. Helena and then decided to run non-stop for

England, keeping clear of the Portuguese sea lane—a decision which put him in the Doldrums once again, where he was becalmed for five weeks. To obtain food and water Lancaster made for the West Indies, where for twenty weeks he prowled about the islands picking up a little food and keeping constantly on the alert for the marauding Spaniard. With painful slowness he victualled and watered for the run across the Atlantic. On an islet near Porto Rico the final stroke of misfortune came. Lancaster was on shore with the majority of the crew when a sudden hurricane drove the *Bonaventure* out to sea with only six crew on board. They were unable to work the ship back and so sailed for Plymouth. Lancaster and the remainder of the crew were eventually picked up by a French ship and brought home. They reached England three years after they had left it.

His experiences had been among the worst of any of the sixteenth-century global voyages, but the rewards were great. The crew of six ailing men who brought the *Bonaventure* back had a fortune in the hold. A small ship, a few sailors, and unlimited tenacity and pluck had drawn aside the Eastern curtain, challenging successfully storm, starvation and Portuguese monopoly. Four months after his return Lancaster was away again on a London-financed expedition. Before his death in 1618 the East India Company was formed and the British ships which were to have a British monopoly of the Indian trade for more than two hundred years were sailing on the sea route he had pioneered. Lancaster had opened the greatest trader's chest of all.

The brilliant Walter Ralegh was not with his half-brother Gilbert when Newfoundland was formally taken under the English Crown. There is an indication of England's rapidly increasing interest in the possibilities of colonization in Ralegh's devotion to its furtherance despite the wide interests of his life and the calls on his time by his Royal mistress. It has been estimated that he spent more than £40,000 of his own money on his projects in Virginia. Given a Patent, he sent four ships and two pinnaces across with his first colonists in 1585. Grenville landed them at Roanoke, an island off the coast of North Carolina. A supply ship due to arrive later



15. One of the historic battles of the Atlantic: the Battle of the Saints' Passage in 1782. (Engraved by Mazell after a painting by Thomas Luny)

in 1607. The Charters granted by James I to the Plymouth group permitted colonization of Northern Virginia, actually the land lying between the 41st and 45th Parallels. Southern Virginia, between the 34th and 38th Parallels, was granted to the London Company. The no-man's-land in between—the area of New York and New Jersey—was available to both for hunting, mining, and forestry supplies, but settlements had to be at least one hundred miles apart. This peculiar arrangement, leaving what was to be the most important part of the United States uncolonized, resulted in the Dutch claiming it as theirs.

The Plymouth Company, as was natural with the New World atmosphere which pervaded the town of its origin, was far more enterprising than its London rivals. Under George Popham, brother of England's Lord Chief Justice, and Raleigh Gilbert, an experienced sailor, a carefully organized expedition in two ships set out in the summer of 1607. They arrived on August 11 and chose the mouth of the Kennebec as a settling place. It was a bad winter and the majority soon returned to England. A few stayed on in the excellent little village they had built, and the State of Maine rightly regards the area and the year as the beginning of English colonization. What is of maritime interest is that a small ship ferried goods and passengers among the settlements along the bay of Pemaquid. Named the *Virginia of Sagadahook,* she was the forerunner of the great shipbuilding industry of this coast.

This revival of interest in American colonization was largely due to John Smith, an Elizabethan in the most adventurous spirit of the word. Born in Lincolnshire, he went off in his youth to fight with the Hapsburgs in Transylvania against the Turks. En route he was thrown into the sea by some Catholics because he was a Protestant. A passing privateer picked him up and he tasted maritime glory, as well as becoming a rich man, when he assisted in the attack on a convoy bound for Venice. Taken prisoner by the Turks, he was made a slave. Escaping, he eventually reached England and promptly set about his colonization enterprises in America.

Smith was made Governor of Jamestown and ruled his little group with a rod of iron. His fellow settlers rightly or wrongly suspected that he intended to make himself a chieftain on Red Indian lines, with the famous Pocahontas as Queen. He returned to England in an aura of some disgrace, and probably the most serious charge that can be laid against him is that he realized, as few others did, that discipline was essential in order to avoid disaster. The Jamestown settlers were tainted with the prevailing greed for precious metals and loot as the *sine qua non* of American conquest. John Smith wanted farmers and fishermen instead of gentlemen-adventurers around him. He believed that the soil and sea were the real wealth.

Nor were the stories about the Pocahontas affair justified. The Indian Chief's daughter was only twelve when she pleaded for Smith's life from her father. Her precocity in love was no different from that of other girls in the tribe who, when friendly terms were established, were more than willing to cement the bonds between England and America by surrendering themselves. Actually Pocahontas married a widower named Rolfe, and as Mrs. Rebecca Rolfe came to England in 1616 where she was fêted with enthusiasm. The few months before she died of consumption were happy ones for the first American-born English bride in history.

In 1614 Smith began to persuade West Country merchants that a veritable silver mine lay under the sea of Cape Cod—myriads of glistening fish swarming over square miles of sea. He had "a bee in his bonnet" about the possibilities of New England—a bee that buzzed to good account. After overcoming lethargy by sheer enthusiasm he set off in 1615 with fifteen settlers. His ship was forced back by a North-West gale. At Plymouth he transferred to a 50-ton barque which was held up by French warships. While he was negotiating with the captain his crew ran off with the ship. He had as adventurous a time as any Atlantic traveller before or since. The French had perforce to keep him and they asked him to help every time they fought a Spanish ship, but they put him in irons when the enemy was English. Back in France he escaped from the ship and reached land where it took him a long time to convince the French authorities and the English diplomatic staffs that he was not dead. When he eventually got back to Plymouth he had again to convince everybody who he was. Though he did not sail again his passionate belief in the possibilities of settlement in America inspired thousands of West Country people to sail to America when opportunity offered. He wrote books about New England, and visited the great estates of Devon and Cornwall to persuade the sons of the family and the servants to emigrate.

In 1620 the journey of the Pilgrim Fathers inaugurated the centuries-long travels of men and women to the New World and freedom, not for the purpose of looting and fortune hunting, but to begin a new life. A weather-worn stone arch on the Barbican at Plymouth commemorates the start of this adventure, though it was an accident that the steps which lead to the water's edge marked the scene of this historic enterprise.

The *Mayflower* was square-rigged and double-decked, of 183 tons. Her master, Captain Jones, was an experienced sailor who had for some years plied regularly in her between West Country and French ports, principally in the wine trade. Occasionally he had taken his vessel North as a whaler, hunting in the seas off Greenland. His ship was chartered to take off some of the passengers on the *Speedwell,* due to arrive from Leyden with English exiles wishing to settle in America. The English Puritans were to join the expedition at the same time.

The *Speedwell,* a vessel of 60 tons, to which extra canvas had been added to increase speed, was in trouble a few hours after the two ships weighed anchor and left the Solent on August 5, 1620. They put into Dartmouth and looked in vain for the source of the leak in the *Speedwell* (the trouble was that under a press of sail the timbers of the hull opened, closing as soon as she hove to.) After nearly three weeks' delay they set off again, and when off Southern Ireland the leaks in the *Speedwell* became alarming. Once again the ships put back to port, this time to Plymouth. Eighteen of the emigrants thankfully left the ship for good. The captain of the *Speedwell* let it be known that he preferred the comparative safety of coastal voyaging and he returned to London. The remaining passengers were crammed into the *Mayflower*—102 people into a ship built for 50 at the most. Twenty-four families were represented—these including servants as well as children. The passengers' well-being and discipline were in the hands of a 60-year-old man named Brewster, known as the Ruling Elder. Only eleven of the 44 men were over 40.

The fantastic voyage was redolent of romance and drama. A single man named John Alden, taken along as a skilled cooper, fell in love with Priscilla Mullins, and spent his honeymoon in America. A Mistress Hopkins gave birth to a baby boy in mid-ocean—he was christened Oceanus. One of the seamen fell ill with what was suspected to be plague and died suddenly. By this time the *Mayflower* had struck an Atlantic gale and the ship was in imminent danger of destruction. As the Pilgrims were at the " point of no return " it was as safe to go on as turn back. Captain Jones was a level-headed and calm master. To obviate straining his ship he took in all sail and allowed her to drift at the height of the storm. Meantime the passengers, though weak from sea sickness, methodically caulked the leaks in the decking, managed to repair a main beam in the hull, and attended to the injuries of the seamen.

The intended destination of the *Mayflower* was the Hudson River. When land was sighted on November 9, more than two months after leaving Plymouth, the master correctly identified it as Cape Cod. They had no permission to settle in Massachusetts Bay. Errors in navigation had brought them to the American coast more than 200 miles to the North of their expected landfall. They would have continued South but for the shoals they encountered near Nanset Beach and the cessation of the wind which had blown so cruelly on the long passage. The discipline which had been maintained at sea began to disappear when the leaders announced their decision to anchor in the shelter of Cape Cod in Provincetown Harbour. The younger folk realized that the settlement site was really illegal and they therefore considered that authority no longer bound them to obey. The result was the drawing up of the famous Instrument of Government. It was as new in concept as the land of its origin, the preface of the constitutional liberty which heralded a new and enlightened age. Afterwards they made sorties by boat along the coast in the miserably cold weather of November, finally fixing on the pleasant bay south of Boston harbour which John Smith's map had named Plymouth. The battered old *Mayflower* followed, was eased beside a rock at the water's edge, and on 20 December the Pilgrims stepped ashore, thanking God who had "again set their feet on stable earth, their proper element".

The obstinate spirit which had carried the settlers through the rigours of the crossing lived on in the terrible months which followed. Death could and did take some but it was the only enemy that could wrest them from their land. Reduced to some twenty men to look after the surviving women and children, the settlers could have justifiably decided to admit failure, for ships came to take them back. But those ships returned to England without passengers—only letters quietly explaining their intention to remain. The story of the settlers in the New World town of Plymouth sparked the imagination of men and women in the Old World town and far beyond it.

The Atlantic and its continent beckoned more voyagers and more settlers. The hard-won success of the Pilgrims encouraged more searchers for freedom. In 1634 Lord Baltimore made a settlement for Catholics in Maryland. William Penn took his Quakers to Pennsylvania. James Oglethorpe, with a grant of £10,000 and some land, arranged for debtors to be taken from the crawling prisons of London to Georgia. The shipping routes from England to America were becoming lines of life and hope. Within two decades there were 26,000 settlers in New England alone, mostly people from Devon and Cornwall, descendants of the seamen whose homes were within sight of the ocean they had sailed and loved. For their life on land they adopted the code which old John Hawkins had given to his men on that first English voyage: "Serve God daily; love one another; preserve your victuals; beware of fire; keep good company." It served them well.

CHAPTER VI

TRADE AT THE HELM

EXPLORATION had swept in every direction from the British Isles to signpost the Atlantic for the traders and speculators. The riches of the Indies were there for the taking, though at a cost in time, money, and life. The colonists in the New World made ties of both sentiment and profit across three thousand miles of ocean. The new age had come slowly and late to Britain; now it was to cause an expansion which neither commerce nor government could envisage. Sea power over the Atlantic eventually made England the supreme world trader and carrier. One by one she pushed her rivals out of the premier position, the attitude being that there was room for only one power on the ocean. Spain, Portugal, the Netherlands, France—they all succumbed, though sometimes the battle was long and the victory ephemeral. In the first decade of the seventeenth-century imports and exports to and from Britain amounted to 5½ million pounds annually. By the time of the Napoleonic Wars, when almost all the European trade ceased and Britain was able to blockade the world, the figure had risen to 13 million.

At the outset, the trade expansion came from the ships which followed in the wake of Lancaster's expedition. The East Indiaman, in the early years of John Company's history, was a splendid merchant ship. The trouble was that she did not change with the times. In the early part of the seventeenth century the Company was faced by a powerful shipbuilding ring. When a ship was lost or broken up the same yard, by tradition, built the replacement, and the design was usually a duplicate. The East India Company organized its own yards at Deptford, where huge stocks of timber and an army of craftsmen were maintained. There was nothing conservative about Deptford's ships at this period. One, *Trade Increase*, was of 1,100 tons when she was launched in 1609. Unfortunately there was insufficient knowledge of the sail plan and rigging for a vessel of such a size, and no crew was capable of handling her, so that she was lost in the Indian Ocean. The Company also alarmed the shipbuilding industry by starting construction in India, using teak. The resulting vessels were heavy and cumbersome, ideal for the buffeting on the Cape route—but as slow as anything that had ever sailed the seas. After these experiments with large ships, the Company reverted to vessels of about 200 tons. They increased gradually to 400 tons, and not until the last years of the Company's existence were there many of 750 tons and upwards. Only the monopoly and the British Navy ensured that the East Indiamen were not driven off the seas by competition—and the rivalry came almost entirely from the Dutch.

Late in the race for world trade and traffic, the Dutch made phenomenal progress in the seventeenth century. "Waggoners of the Sea" was a British term of contempt as significant as Napoleon's jibe about the British "nation of shopkeepers". Both were unconsciously true statements and reasons for the political power of the two countries. Two geographically insignificant but fortunately situated countries built up great power through the ambition of their merchants. Where trade led, the navies and armies followed. By the middle of the seventeenth century the Netherlands' merchant navy had reached the fantastic total of 20,000 vessels. Many were, of course, in the coastal, Baltic and North Sea trades, but a formidable number were ocean tramps. They were built cheaply of Scandinavian softwood, manned with well-paid crews, and overloaded beyond danger point. On the seas beyond the Cape they were faster, paid better, and tapped the treasure beyond India. The early large profits of the British ships on the Eastern run dropped considerably by the time Charles I came to the throne—though they were never less than 12 per cent on the investment.

The vessels of the East India Company brought goods which changed the habits of Britain and Europe. Raw silk was re-exported to France. The indigo from Bengal was a rich dye such as the West had never known. It was added to the kaleidoscope of colour which Atlantic exploration had made possible: red cochineal from Central America, woods which stained brilliant yellow and orange from South America. Coffee and tea became fashionable if expensive beverages. Great quantities of Indian saltpetre gave the British Army and Navy resources of fire-power second-to none in the world. And, of course, there were the spices which had been the goad driving merchant seamen into the unknown oceans for more than a century.

The East Indiaman followed a precise route from London through the Channel and South to Madeira. The Equator was crossed near 20 deg. of longitude, and the ship then continued on a South-West course until she found the South-East Trades; later the prevailing Westerlies would be met with, probably between the 30th and 40th Parallels. She might turn Northwards when well East of the Cape of Good Hope if bound for India or continue West if on the China run. If the passage had been over-long or an unusually large number of passengers were aboard a call at the Cape was essential for food and water. A satisfactory time for the passage through the Atlantic was two months. Homeward bound, the Atlantic section was covered on a track closer to the African coast, bowling along with the South-East Trades and calling at St. Helena for water, then going well West of the Cape Verde Islands to pick up the prevailing South Westerlies, joining the main route of the vessels in the West Indies trade.

British shipping in the West Indies was able to develop despite the proximity of rival European powers because British seamen soon realized that the powerful currents and prevailing winds made it almost impossible for ships regularly to approach the Caribbean except by sailing close to the Antilles. Strangely, the Spanish did not trouble to colonize these islands, and in 1623 Britain was able to take possession of St. Kitts, and soon afterwards placed settlements on Barbados. Though the Spanish treasure cities were nearly a thousand miles away the British were thus in a position to swoop on them and to straddle the sea lane which the Spanish virtually had to use. The later possession of Jamaica took Britain still nearer and made domination still easier. Homeward bound, the usual route for shipping was with the current of the Yucatan Channel, along the Florida Peninsula and through the Bahamas Channel. The shorter route between Haiti and Cuba was less advantageous because of the adverse Trade winds. Bad weather was usual off the Newfoundland Banks, but thereafter the South Westerlies made the passage speedy and usually uneventful.

The wealth of the West Indian export trade was closely bound up with the colonies of North America. By the eighteenth century a 3-way trade among the Caribbean Islands, the North American settlements and Europe existed almost in spite of efforts to prevent it. In the days of the Stuarts economists and politicians were disappointed in the result of the organized and spontaneous Atlantic settlements.

The Spanish had looted El Dorado and were hanging on to the places still worth exploiting. The North-West Passage remained a dream. Cathay was still out of reach, and the inhabitants of North America proved to be poor purchasers of textiles and other goods of the trading ship. The granting of colonization rights had been largely impelled by the desire to remedy this situation. Colonists could be landed in areas where they could produce wealth for the promoters; it would help to solve home unemployment and in time create ready-made customers for British goods.

Most important of all from the government's view, the existence of colonies necessitated ships and men to sail them. The farther away they were the better, for more ships would be needed. The lethargy of Henry VII's time as regards sea power had gone. The example of Henry VIII and the experience of Elizabeth were remembered. Britain, at whatever cost, had to find plentiful reserves of trained seamen and a goodly fleet of ships. The Admiralty was worried at the dependence of the shipyards on Scandinavian and Baltic supplies for much of the timber needed for ship construction. On the Atlantic seaboard of America were unlimited sources of softwood. Years later, that timber meant unbeatable competition from the American clipper; but for more than a century the timber from America materially helped to build up Britain's naval power. It helped to fill the gaps in the rapidly disappearing forests of oak in England.

Colonies farther South than the wood-producing areas like Newfoundland and Maine would, it was hoped, yield products like wine, fruits and other luxuries which came from Europe. Virginia was one of them, and there was something akin to consternation when its principal yield proved to be tobacco, particularly as the colonists soon built up a vigorous trade with the Dutch in the poisonous weed. But the colonists were delighted at the riches obtainable from this comparatively easily grown plant, and tobacco plantations were started in Maryland, Bermuda, Guiana, and West Indian Islands (the last soon turning over to sugar). Thus, while seaborne trade with the New World did not comprise exactly what the promoters hoped, it was remarkably quickly fulfilling one need: the stimulation of maritime traffic. The one exception was Plymouth Plantation, where the Pilgrim Fathers were living much as any village community in agricultural England, and dependent on external trade to about the same extent. Ten years after the pioneers arrived they were joined by the colonists of the Massachusetts Bay Company, a vigorous organization which, though ready to live under the same austere rules as the Fathers, was anxious to build up prosperity and power.

To the annoyance, even horror, of London shipping circles, they were soon exporting foodstuffs to the colonies South of them, and it was not long before they were using their own ships, thus laying down another great Atlantic trade route, its terminus at Boston and its lines running along the entire Eastern seaboard of America. Some in all probability crossed the Atlantic to trade with Europe, adding to the already serious competition from the Dutch.

Laws were promptly passed that all colonial produce had to be exported to or via British ports, and patrol ships hung about the Western Approaches to escort all ships homeward bound from British colonies to Britain. This, and almost every other restrictive law, broke down during the English Civil War. The colonists, whichever side they favoured, saw no reason to obey rules which neither side could enforce. During this period the Dutch grabbed much more of the shipping business between Europe and America. The British Navy's flag was never seen in colonial waters, and most of the settlements thought it safe to revolt against these restrictive laws.

The Commonwealth Government tried to improve matters by the first Navigation Act, which in 1650 prohibited trade with the rebellious colonies (Antigua, Barbados, Virginia, and Maryland) and permanently prohibited trade with foreign shippers, and soon after the first enactment in 1650 a naval squadron was sent across the Atlantic for police work. It brought the people of Barbados to heel, captured some Dutch merchant vessels, and waved a warning flag in the faces of the colonists farther North.

There were more fruits of maritime enterprise to be taken: from Portugal Cromwell obtained guarantees of the right to trade with every colony of the dying Portuguese Empire. From Spain, still vigorous enough to resist a request of this kind, which was in effect a demand to enjoy the rewards of the Empire founded by Castile, he endeavoured to take both trade and possessions by force. Through war-weariness he failed to gain an Empire which would have stretched from the Equator to the Arctic Circle, and had to be content with the consolation prize of Jamaica. The rabble which achieved this easy conquest were left there to colonize the island. They were too weak and too poor in resources of every kind to make a success of it, and they had to be aided by other colonists. This need inaugurated the mixed emigrant traffic, for Jamaica and other nearby colonies began to receive people of many races. Scotsmen and Irishmen were numerous (regarded as foreigners by London merchants and politicians), a few Norwegians went at Cromwell's request, and after the Restoration there were French-assisted emigrants. Germans, Swiss, Netherlanders subsequently followed to the newly acquired colony of New York, where 6,000 Dutch inhabitants remained after Britain captured New Amsterdam in 1664.

The rapid increase in population resulted in the North

American colonies finding their natural trade outlets among each other, whatever the home government tried to do about it. In the event, it did well enough by imposing harbour dues and import and export duties, but it was unable to understand that the real result was beneficial to the homeland which eventually gained the economic rewards. Typical of this attitude to the colonists was the case of Newfoundland. By far the most experienced of the Atlantic sailors in the seventeenth century were the fishermen who went to the Newfoundland Banks. There were at least 6,000 sailors so engaged by the time of the Restoration. They left their English ports in the spring, fished all summer and came home in the autumn. Soon a few settled on the coast for months at a time, fishing a few miles off land and selling their catch to the colonists farther South. Although there were fish enough for everybody, the ocean-going fishermen hated their rivals (the Boat Men as they were called), put up specious arguments about the complete loss to the Mother Country of the trade in which they indulged, and persuaded Charles II actually to close down the colony. At first the orders were to move them away from the coast so that fishing became impossible, and when that direction was ignored to bring them all home by force. The longshoremen thereupon threatened to change their nationality to French, and live with a few Breton fishermen in the same way of business as themselves. This enabled them to win the day. The naval squadron sent to take them off returned immediately and pointed out that it was better to have recalcitrant Englishmen than French in the colony.

Some shipping firms flourished on the purely inter-American trade, their vessels staying on the Western side of the ocean permanently, but the *élite* of the North Atlantic merchant ships were those known as Regular Traders which sailed from one English port, usually making two voyages a year. The first was arranged to arrive on the North American coast in mid-spring for furs, timber and fish oil. Unloading and loading of cargo was rarely completed in less than a month, and the vessel would be back in her home port by the end of June. A further month to six weeks on the turn-round and she would be back in America by early harvest time. Her last passage of the year brought her home before the winter gales. The months before the routine was repeated were spent in repairs and refitting. This sailing schedule lasted from the early days of colonization until the Black Ball liners ran to a strict timetable, full or empty, so that they were working the year round and making six crossings annually.

All this ocean traffic was augmented by ships on a triangular route England-Africa-America. They were the slavers. Old Jack Hawkins was one of the first to discover this source of revenue. On his 1567-8 expedition he spent the winter buying negroes in Guinea and sailed with 400 of them packed into four ships. He had sold them all by the end of July, 1568.

Of the evils which followed the Atlantic explorers as well as the benefits of their voyages the slave trade stands in unsurpassed position of cruelty and greed. The Spaniards, when their pillaging and executions had either destroyed or driven off the available source of slave labour in the New World, began to buy manpower from the Portuguese, who had regarded slaving as a natural part of their trade activities along the West Coast of Africa. The Papal Bull of 1493, which attempted to divide the Atlantic spheres of interest neatly between the two great exploring nations, gave Portugal a monopoly of African slaving, and the Spaniards were forced to buy from their neighbour and rival.

The Company of Royal Adventurers Trading into Africa was given a monopoly of English slave trading after 1663, but the merchants of Bristol, Falmouth and Liverpool were as ready to challenge the monopolists as the foreigners in order to gain a share in the business. Eventually the Crown faced the inevitable and permitted any English merchant to trade in African slaves on payment of ten per cent on all merchandise exported or imported. This money was used by Royal Africa to build forts on the Guinea coast.

The Dutch and the French tried in vain to compete with the British slavers. By the 1720's Britain was the great slave trading nation of the world. Bristol, as always in Atlantic-borne trade, was the most prosperous port with at least eighty ships engaged in no other traffic. Later Liverpool took the lead and shortly before slavery was abolished the port had on her registers 157 slave ships capable of carrying some 37,000 African men, women and children to the Americas. The value of this human merchandise was on an average of 1½ million pounds a year, the typical healthy male slave being worth £40 though prices up to £80 were known. After the establishment of British colonies in the New World, and before the secession of the North American colonies, British planters bought 2,116,000 slaves. Further large numbers were re-sold to Spanish and Portuguese colonies in Central and South America.

In the early years the buying price of a slave might be a few trinkets. Later the native chiefs got greedy, and the supplies had to come from the interior of the continent. A fair price at the zenith of this ghastly trafficking was £25 worth of trading goods for a sound young male slave from a tribe with a reputation for good work and even temper. The Portuguese slavers had usually followed a practice of making sorties inland and capturing small communities. They sometimes employed missionaries to convert the shackled captives en route for the coast. The English slavers dealt with native chiefs and merchants, though they were not above fomenting tribal wars to obtain a good supply of captured warriors.

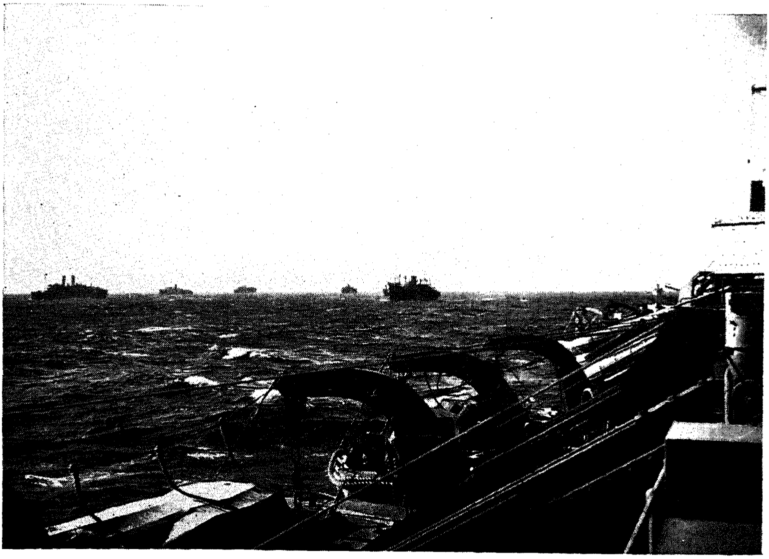
Few people saw anything wrong in the principle of slavery, though from Elizabethan times there had been those who abhorred the cruelty involved. Slavery was mentioned and not condemned in the Bible which was good enough for most consciences. Anyway, its continuance was regarded as vital for the maintenance of the colonies and for the continuance of the country's commercial supremacy. Slaving undoubtedly formed the mainstay of the country's early Atlantic trade, all other merchandise being an ancillary. The powerful mercantile interests used slavery to build up a triangular trading route which was a shipper's dream. The slavers sailed from Liverpool, Bristol and London for West Africa with a mixed cargo of trading goods (which invariably included large quantities of arms and spirits). With this they bought ivory, gold and slaves. The slaves always outweighed in bulk and value anything else. After the sale on the West Indian market, for use on the plantations or re-export to the mainland, the slaver took on tobacco and sugar and sailed for home. Thus there was a profit on the African trading goods, profit on the slaves, and profit on the tobacco and sugar. The voyage usually took about a year, though the passage with the slaves aboard was seldom more than six weeks. If adverse weather delayed the vessel losses through deaths were serious. It was said in favour of the French that mercury and arsenic were always carried to poison off the cargo should food and water run short, while the British simply threw their negro merchandise overboard.

A typical slaver was about 100 tons in the early years, increasing by the late eighteenth century to 200 tons. The number of slaves crammed into the holds, according to actual records, was unbelievable. Between 3-400 were usual, and the owners' prospectus to shareholders made allowance for a percentage of loss. Sometimes disease and storm sent the figures soaring. In 1693 two ships crammed with 1,300 slaves lost 320 on the Middle Passage. In 1788 an Act was passed to eradicate the worst of the evils. There had to be 5 ft. between decks, and the loading ratio was 5 slaves for every 3 tons burden up to 160 tons—so that the typical 150-tonner was permitted to carry a maximum of 250. The regulations were generally ignored. From 1789 Wilberforce pleaded year after year for abolition. Mercantile interests managed to thwart him until the traffic was outlawed in 1807, but it was not until 1824 that it was proclaimed an act of piracy punishable by death.

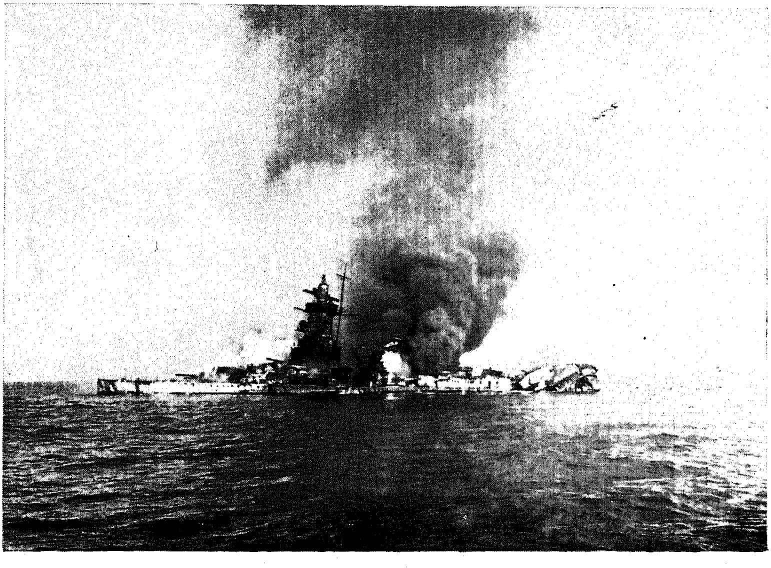
The attitude was understandable if unforgivable. The prosperity of the West Indies and the Southern states of North America depended on slaves. Liverpool had emerged as a great seaport as a result, by the beginning of the nineteenth century being pre-eminent just as London had been in the seventeenth and eighteenth. There were many level-headed and kindly people who genuinely believed that the abolition of the slave trade would destroy British commerce. Certainly there were thousands of people who faced ruin without it, and a more vociferous group who disliked the loss of great wealth. How wealthy a slave financier could become is indicated by the accounts of typical enterprises. In 1803, for example, a Liverpool ship was stocked with £8,900 worth of trading goods. These purchased 412 slaves. From their sales the trader was able to load up with sugar and timber. Total net profit was £24,000. This was regarded as a satisfactory expedition. Another Liverpool enterprise which cost £11,400, including the ship, yielded a net profit of £13,270, and was quoted as a poor investment.

Although the United States prohibited slave imports in 1813, the fact that she did not abolish slavery until 1863 made illegal slave running a profitable industry. New York harbour had many ships being fitted out in the 1860's which were obviously for slave transport. The trade was usually between Africa and Cuba, with an occasional run to the Southern States when the coast was clear. In its death throes the Atlantic slave traffic reached an apex of horror. Brazil and Cuba wanted slaves, and France, while paying lip service to emancipation, did not abolish slavery in her overseas possessions until 1896. British warships patrolling the usual routes between West Africa and the Central America forced the slavers to run far South. The passage became longer and shipwreck more likely. When the slavers were discovered by the naval patrols—and in a period of thirty-six years they captured and released 117,000 slaves in transit—the crews were not above jettisoning their human cargo like a rum runner of the 1920's would heave his crates of liquor overboard.

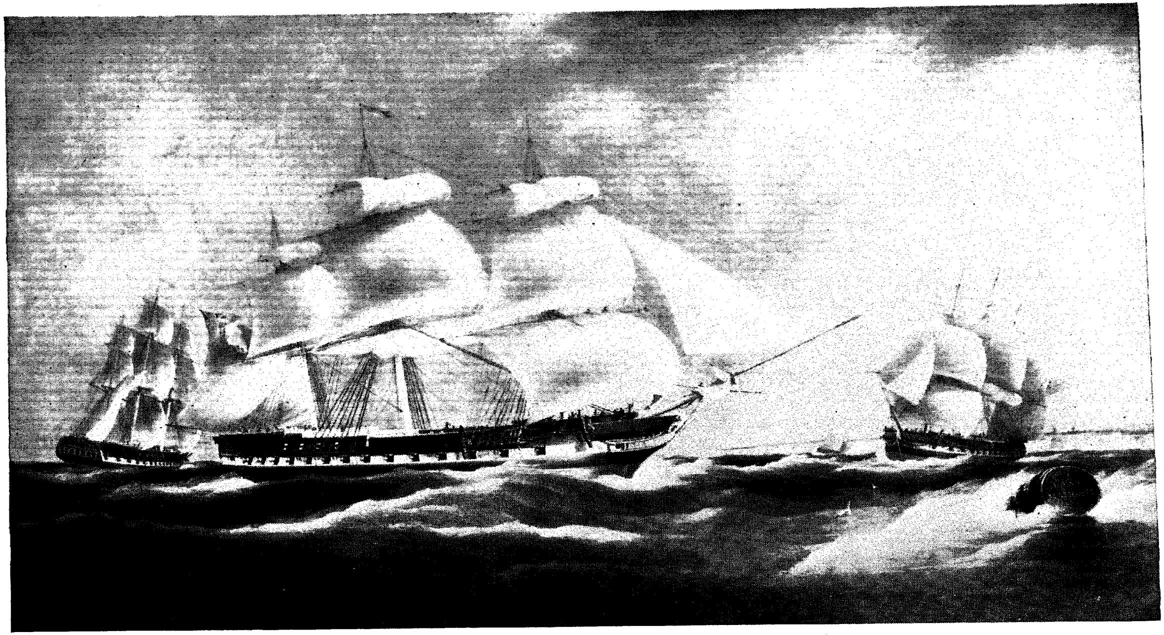
With the disappearance of the slavers the Atlantic became a cleaner ocean, though the inhuman bestiality was copied in the cattle boats bound for Europe. This was largely eradicated with the development of refrigeration. Not until 1875 did a ship sail from New York with a cargo of beef, the meat kept fresh by a hand-worked fan blowing air over blocks of ice; within ten years 40,000 tons of frozen or chilled beef were being shippd from America, a small proportion of it from the South where British capital and enterprise had necessitated another great shipping route over the ocean. These lines had opened up the South Atlantic in the early nineteenth century when the countries fought for their indepen-



16. Twentieth century Atlantic Armada. Part of the convoy which sailed from Britain to join another from the U.S.A. for the invasion of North-West Africa by the Allies in November, 1942



17. Suicide of an Atlantic raider: the last minutes in the life of the German *Admiral Graf Spee* outside Montevideo Harbour, December 18, 1939



18. An East Indiaman at the climax of her development the *Herefordshire* in 1813. These vessels, always semi-military ships, increased steadily in size from about 400 tons to 1,200

dence from Europe. The loneliest part of the ocean saw ships in growing numbers, but the far South was the domain of the whalers, manned by the toughest of all men who went down to the sea in ships. The British whalers were manned mostly by Scotsmen; until 1824 they were subsidized because of the competition from the New Bedford and Nantucket whalemen. Never before or since have there been such men as those immortalized in Melville's *Moby Dick*. They were often away for as long as five years, and their activities changed the natural laws of sea life. For the first time since geological pre-history the whale was driven to the far corners of its kingdom. This was the cost of providing the lighting and lubricant for the industrial age which poured its goods and peoples across the ocean—an ocean which by the end of the Napoleonic Wars bore on its bosom thousands of boats and ships on any given day. A little over three centuries earlier there had been half a dozen timidly probing along Africa and towards the Indies.

CHAPTER VII

BATTLES GREAT AND SMALL

VIOLENCE followed close on the heels of exploration. "War is hell", but the wars of the Atlantic have had the tang of fights for freedom about them. If they typify some of the most bitter clashes between ship and ship, nation and nation, there have also been chivalry and nobility to leaven the story. Before all glory was extinguished in the twentieth century wars there was the final flash of gallantry between adversaries in the deep South of the Atlantic. Under the grey skies South-East of the Falklands in December, 1914, British cheers echoed across the sea in honour of the handful of men who were the survivors of Von Spee's last cruiser, the *Gneisenau*. There were no cheers for an enemy which thereafter waged war on men in lifeboats; which sank helpless merchantmen at sight. Perhaps the old decencies and honours showed palely in 1941 when the North Atlantic's vastness became an aircraft hunting ground, and the greatest maritime chase in history ended with the sinking of the *Bismarck*. She died nobly, and her British victors recognized it.

The 1939-45 Battle of the Atlantic, hottest near the fortress of Britain, but sending eddies of danger to the American coast and into the cold waters North and South, was a measure of the growth of Atlantic warfare. The thousands of miles over which the combatants ranged in the Second World War can be contrasted with the small decisive battle nearly five centuries before when Portugal looked out on the ocean and girded herself for battle. King John the Great transformed his little country into a potentially powerful kingdom when he finally drove out both Moors and Spanish, and recognized the coming tactical power of nations who used the sea instead of feared it, by making a lasting treaty with England. He married Philippa, niece of Richard II. Their sons included Henry the Navigator.

Though the Moorish stronghold of Ceuta was only across the Straits no attempt had been made to attack it because of the difficult terrain which lay to the West of the city. John and his sons planned to attack by sea. Preparations included the construction of thirty new warships and the re-equipment of many merchant vessels for a great amphibious operation. English ships were in the force, which totalled 240 vessels, carrying 20,000 assault troops in addition to 30,000 sailors and galley rowers. The voyage was uneventful until the leading ships were off Ceuta. Then a gale blew up and the ships were scattered. A week later, at twilight, the fleet sailed into view of the defenders. During the night they entered the harbour and at dawn they swept ashore. Victory was complete. Enemies were less likely to swoop on Portuguese vessels probing along the African coast, now the nest of Moorish sea fighters perched at the Mediterranean gate to the ocean was destroyed. By using the waters of the Atlantic, Portugal had burst her bonds and inaugurated the expansion that was to make her a great colonial power—and by far the most resourceful of the sea explorers.

When the Portuguese and their Spanish neighbours opened the Atlantic by exploration, and promptly closed it to anyone but themselves, they created a situation which was the reason for almost all the great clashes on the ocean until the United States and Germany shifted the focal point of dispute. But from Drake's beard-singeing expeditions to the American-Spanish war the battles are basically over this ownership of the ocean and the challenge to it. Not only did it engender the majestic meeting of national fleets, but it gave reason for exploits of piracy unexcelled in history for brutality, bravery, adventure, tragedy.

The 500-year-long Battle of the Atlantic can and does fill a library of books. For every reader there are skirmishes important and unimportant, contestants famous and infamous, which he remembers best. Here the author cites his own—a small part of the whole, briefly told, but possibly showing the continuous thread of events which has been woven into the political and naval scene of to-day.

The lust for loot undoubtedly brought about the first clashes between England and Spain on the Main. The cruising marauders from Devon were the reason for armed escorts and the use of convoys, but the adventure was turned into a campaign through hate. Treachery has always played its part in nations' histories, but the treatment of Hawkins and Drake at San Juan de Ulloa in 1568, when Spain and England were at peace, stands out in the examples of it. No political treaty could ever have banished the desire for revenge felt by English seamen—and the Queen. Their hatred was fanned still hotter when years later stories came from the few survivors of the group who were put ashore from overcrowded ships. Many died from disease. Others were driven to death as galley slaves or as unpaid servants to Spanish plantation owners. The stories of forced marches without food or clothing while the guards screamed "March, you English dogs, heretics and enemies of God! ", the sinister trials where they were either condemned to be burned as heretics, or flogged for inability to say their prayers in Latin, were not forgotten when Drake and others called for men to sail with him and singe the King of Spain's beard.

Drake's first exploit was his attack on Nombre de Dios, the store base for the treasure trains from the Peruvian mines. He sailed from Plymouth in May, 1572, in two ships and with a volunteer force of seventy-three. The attack was hardly a naval engagement because Drake and his men rowed ashore at night. Despite efforts to make the force of fifty sound larger by using drums and trumpets, the attack failed.

Drake's next exploits were inland, and he captured a mule train of 190, taking the gold ingots but leaving the silver owing to the weight. In a captured Spanish ship (his own had been scuttled) he arrived back in Plymouth after being away for fifteen months. In the next exploit he sailed into the Pacific in the *Golden Hind* and made his famous global voyage, gaining a Knighthood and £10,000 worth of spoils as rewards.

Then followed his greatest naval battle in the undeclared war of England and Spain when he dared to sail into the very jaws of the enemy. The attack on Cadiz in 1587 was carried out by twenty-six ships, a mixed force of privateers supplied by city interests as a speculative venture and by small war vessels loaned by the Queen. Drake hoisted his flag in the *Elizabeth Bonaventure.* With hardly any delay for conference he sailed straight into the harbour where sixty ships in varying stages of preparation lay at anchor or on the stocks. The galleys were the first to attempt to stop him. Broadsides spread carnage in these ships, some of which had two hundred rowers. Next, five galleons were put out of action, and then in a tiny vessel, the *Merchant Royal,* Drake entered the inner dock and set a 1,500 ton galleon afire. Though a few more galleys attempted to pen him in, Drake was able to destroy some 10,000 tons of shipping, from most of which he removed anything worth taking, before he impudently turned Westwards and with a God-given offshore wind, put out to sea. He lost neither a ship nor a man. If he had had his way and repeated this exploit at intervals no Armada would ever have sailed in a mighty crescent into the English Channel.

Richard Grenville carried on the tradition of Drake's great exploit in the famous engagement at Flores, in the Azores, on August 31, 1591. He was in command of the *Revenge,* Drake's Armada flagship, one of a force which had been at sea for six months and was in a bad way from lack of repairs to the ships and disease among the crews. They had been waiting on the Spanish Main for weeks to intercept a Spanish treasure convoy, and had finally to give up hope. Then over the Westerly horizon appeared sail after sail—the quarry they had vainly tried to find was bearing down on them exceptionally well protected because the news of the English force had arrived in the Americas. More than fifty ships were counted as the Englishmen tried frantically to get their ships ready for sea and evade being trapped. Grenville had his sick men on shore and he refused to leave without them.

While the rest of the force stood out to sea he prepared to run right through the Spanish convoy—the only reason for his action being that he refused to retire before the enemy. The wind was South-Westerly, but the *Revenge* managed to sail through the first part of the gauntlet at speed without attack—the Spanish were too amazed at first to do anything. In the middle of the convoy the bulk of the galleons stole the wind and the little *Revenge* lay becalmed. The galleons closed on her. Many of their guns were useless as they could not fire low enough, but a fusillade of small shot swept the deck of the *Revenge,* sometimes from five galleons at once. Fifteen ships in all attacked before the light failed, and the *Revenge* sank two of them. She herself was merely a ruined hulk when dawn came. The sick men brought hastily on board were all dead. Only sixty men could bear arms and man the ship. Grenville had multiple wounds and died on board the Spanish flagship. Even in the bitter hatred of Castile and England the enemy recognized fantastic bravery. The survivors, who never admitted defeat but were simply overpowered through physical inability to resist, were treated well.

The glory of Elizabethan seamanship received a staggering blow when James I ascended the throne. The unmoral but effective practice of licensing privateers (with an occasional private and personal investment by the monarch in the enterprise) disappeared. Worse than that, English seamen were forbidden to defend themselves even if attacked. There were no King's Enemies on the broad Atlantic; equally there were soon very few King's Men. The inhabitants of the West Country ports avoided joining the Navy, but any master who called for volunteers for piratical adventure during a round of visits to the taverns was overwhelmed with applicants. The few English seamen pursuing their lawful occasions on the ocean were forced into piracy if they wanted to live. Capture on the Eastern side of the Atlantic meant imprisonment. On the Western side they could expect nothing but slavery, torture, and a lingering death. The men who adopted piracy as a means of living were not always rough desperadoes. Many of them were gentlemen-adventurers, first inspired by pride to challenge the Iberian monopoly, and then turned greedy by the enormous profits to be made.

Piracy was not the monopoly of the English; nor was it confined to the Spanish Main. In the early seventeenth century some newcomers were ranging the Eastern Atlantic. Corsairs from Algiers—they were universally called Turks—not only harried the ships of Spain as they neared the homeland and lay in wait for any infidel vessel coasting along Africa, but came as far as the British Isles. In the days of Drake they would not have dared to sweep into Plymouth, destroying ships and fishing smacks and grabbing English subjects for ransom, but under James I the Navy had deteriorated to such an extent that these courageous and clever seamen were often making sorties against both English ships and harbours. Expeditions were sent to destroy the pirate bases in the Mediterranean, but there was little success for the next two centuries, though they were effectively driven off the Atlantic.

The *élite* of the piratical fleets were Buccaneers or Filibusters, English and French groups respectively, who did not molest any ship unless it bore the flag of Spain. And it was Spain which forced them into being.

When foreign crews were captured in the New World, wrecked on its coasts, or tempted there by a desire to avoid arrest in their own countries because of criminal activities, the best they could hope for was to escape into the lonely areas of the American coast where the Spaniards would leave them alone. These men, who soon totalled many hundreds, found the natives friendly once the mutual loathing of the Spaniards was known. The natives gave them their name of Buccaneer, from the spit on which they roasted their meat. Their code was strict, and for a time Spain considered that they were well rid of these alien men. As most of them were seafarers they made no attempt to form colonies or to grow their food. They lived a nomad existence, always keeping near the coast, and following wild cattle to obtain food. They indulged in a little barter with ships by providing timber in exchange for ammunition, clothing and footwear. As soon as a Buccaneer took a native woman as a wife he was expelled from the Brotherhood. Most of them were quite ready to forswear women's company, choosing a male companion called a matelot, and following a strange sort of communistic existence where no one was a leader and everyone obeyed implicitly an unwritten constitution for mutual welfare and protection. The majority of the Buccaneers inhabited the Nicaraguan coast, and soon their numbers were so great that Spain began a campaign against them.

Their first move was to destroy the wild cattle which provided the basis of the Buccaneers' food supply. The result was to band the Brethren of the Coast into a tightly organized body intent on revenge and forced to seek food outside the lands laid waste by their enemies. For a time they tried to find a means of existence by trading with the natives. The Spaniards forbade it. With the little coasting boats the Buccaneers had built for themselves they attacked any solitary Spanish galleon they could find. By using surprise tactics and cramming their tiny vessels with heavily armed men they won combat after combat, and each time they left with a larger vessel to make the next attack easier. Within a year they were the most feared maritime force outside European territorial waters. The organizing brain behind the Buccaneers was a Netherlands adventurer named Mansvelt, and his second-in-command, officially known as Vice-Admiral of the Confederacy of the Buccaneers of America, was Henry Morgan. After the not fully explained demise of Mansvelt, Morgan became High Admiral of the Fleets and General of the Confederation—titles officially recognized by the Governor of Jamaica, who preferred to have the fleet as an ally rather than an enemy. Morgan's force included French and Dutch privateers, and there were frequent quarrels among the nationals.

The Buccaneers' headquarters at the Keys off Cuba must have presented an amazing and terrifying sight for the hapless prisoners brought in from captured Spanish ships—their lives preserved only because of the information which might be forthcoming under torture. Ships of all sizes were taken there for refitting and re-arming. Sometimes Morgan managed to overcome six ships at a time, and the loot stored under guard represented every stock beast, sack of grain and treasure chest in a city which he had successfully sacked. Discipline was severe, and men were hanged with the utmost regularity for causing dissension in Morgan's motley force—a navy, incidentally which was for a time technically in the service of the Crown.

There can be no doubt that Morgan was a patriotic Englishman. At any age before or after he might well have ranked in the illustrious pages of English military and naval history. When he heard that, in 1668, the Spaniards proposed to capture Jamaica, he undertook to smash the projected fleet at its source. Typically, he was delighted in the chances of enormous loot which success would also bring. His force included some 500 men in nine well-armed ships. "Thank God I have only Englishmen to lead", he exclaimed as he deployed his ships for assault on the fortified town of Puerto Bello. "If our numbers are small the more plunder for each of you," he added as an afterthought.

Puerto Bello was laid waste, almost all of its inhabitants tortured or killed. The loot with which they sailed away was estimated to be worth a quarter of a million pounds, most of it in the hold of Morgan's own Spanish galleon.

Town after town was sacked by Morgan's fleet. Only rarely were the odds on Morgan's side. He won by cunning, bravery, and superb seamanship. There seemed no end to his power, and his ships used to go into action with musicians playing on the deck until the fiddlers were near enough to the enemy to run to man the cannon or grab their boarding pikes. Though he cared nothing for the rules of war, for chivalry, or mercy to the vanquished, Morgan invariably sailed with the cross of St. George at the masthead, and the same flag flew above the burning towns he watched as his ships stood out to sea.

Morgan's greatest exploit really has no place here, for it was a land expedition across the Isthmus of Panama. After an appalling march some 1,200 Buccaneers defeated a Spanish force of more than 2,000, and the surviving 1,000 sacked the town of Panama, then a great city of 30,000 inhabitants. The town burned faster than Morgan intended and much of his hoped-for loot was destroyed. The disappointment caused mutiny to break out, and after the long trek back to the coast more dissension started when Morgan was sharing the spoils. On a night in March, 1671, Morgan, with three captains wholly loyal to him, stole out of the harbour at the mouth of Chagres River, taking most of the loot with him. He probably knew that his day was over, for weeks earlier England and Spain had made peace, and though the news had not arrived officially at Jamaica, Spain justifiably alleged that Morgan had heard of the fact from a prisoner. After a formal spell in the Tower to gloss over such irregularities, Morgan was brought out and knighted by a delighted and admiring Charles II. He returned to Jamaica, dying there in 1688, full of honours and years, a Welsh farmer's son who had become uncrowned king of the Caribbean.

Another distinguished pirate was William Dampier, whose discourse on the Atlantic trade winds, currents, and weather is still as reliable a guide for the twentieth century as it was for generations of seamen after his death. He is best known as a world explorer and for his vividly written diary, but his great love was piracy. He was born in a hamlet near Yeovil about 1651, and had made many crossings of the Atlantic as an apprentice before he was twenty. After serving in the *Royal Prince* during the war with the Netherlands of 1673, he commanded a coastal trader on the American coast, his customers being mostly Buccaneers. He was forced to join them when a storm wrecked his ship. After a not unprofitable period of piracy he came home, but the lure of the Spanish Main was too great, and by 1679 he was back with the Buccaneers, taking part in an expedition which crossed the Panama isthmus and began pirating on the Pacific coast in a captured ship. After a disastrous defeat Dampier and a handful of men struggled back to the Caribbean coast where a French privateer picked them up. Soon Dampier was at sea as a deck hand on an English privateer, the *Revenge*, which sailed in company with another small vessel on a five months' pillaging expedition as far as Cape Horn. Whatever they had expected to swoop on in the South Atlantic they were disappointed and they continued into the Pacific and west to Australia. Dampier came back overland from Indo-China and did not reach England for twelve years.

He seems to have gained no profit whatsoever from these wanderings beyond a rich yield of fascinating material for his diary—and an Indian whom he exhibited at fairs. Eight years later he accepted the command of *H.M.S. Roebuck* for a voyage of exploration to the Antipodes. After a year's roaming on the world's oceans he reached Ascension Island, where the *Roebuck* subsided gently as the sea seeped through her rotten planks. He soon resumed his favourite role of privateer. Of the men who sailed against the flags of all nations in the heyday of the Spanish Main Dampier was the most atrocious failure at making any profit from it. But he was by far the best navigator. He also achieved the rare distinction of dying peacefully in his bed at an age not often attained by his colleagues. He was fifty-nine.

Dampier's peaceful end may be contrasted with the unpleasant death of Edward Teach, a man who conducted a personal naval war with remarkable success. A native of Bristol, as a child he helped his parents as a dutiful son should by creeping among the tables of the Teach's tavern, dropping narcotics in the grog so that the comatose customers could then be turned over for a modest reward to the Naval press gangs or to any merchant captain who needed a crew without paying wages in advance.

Young Teach joined a privateer licensed to attack Spanish merchant ships during the War of the Spanish Succession. His master was Captain Hornigold, one of the most brutal and daring men of even his cruel tribe, who lurked in the Bahamas until informers scattered along the entire American coast came to tell of victims to be waylaid in mid-Atlantic. Hornigold, like most of his colleagues, cared little for such legal niceties as the peace treaty with Spain of 1713 or of the nationality of his prey. Whether they were the King's late, current or future enemies, or the King's ships themselves, hardly mattered to him. In the lonely fringes of the great Atlantic trade route he waited until something worth while came along—and pounced.

Hornigold overrated his able lieutenant's probity. When he captured a French treasure ship he put Teach on board with a crew. Teach promptly informed his men that they were now working for him. By clever selection of victims (he attacked ships in ballast which imagined they were safe), he amassed armaments unexcelled by any ship of the time. He had perforce to make do with short-range cannon, but he installed fifty of them, turning his ship into an invincible adversary at short range. Teach, by this time known as Blackbeard, did not worry about skulking in the Atlantic. He sailed within sight of the British naval fort at St. Vincent, Windward Islands, and grabbed the *Great Allen*. Then he smashed the warship *Scarborough* sent to capture him.

In two years which marked the zenith of his powers he captured twenty vessels. He operated from Honduras to North Carolina, and occasionally put into port for food, medicine and water, the inhabitants of such towns as Charleston being powerless to do anything about it. Finally he persuaded the Governor of North Carolina to pardon him and to make him a sort of official freebooter of the colony. The colonists went to the Governor of Virginia to get help, and as a result Lieutenant Maynard crept through the sand bar off the North Carolina coast to attack Blackbeard in his ship, seemingly safely hidden in the Ocracoke Inlet. Maynard attempted a foolhardy surprise attack. Blackbeard had been warned and his great ship bore down on the little sloops. Suddenly she shuddered to a stop—aground on a sandbank. The Navy sloops tried to manœuvre so as to reach Blackbeard bow-on, out of the range of the guns. They failed to make it before the rising tide enabled the pirate to swing to near-broadside. One sloop was disabled, but Maynard kept on, with half of his crew dead or wounded. A hail of rum bottles stuffed with powder and bits of metal smashed more of the Naval men to pieces. Only Maynard and twelve of his crew were alive when the ships closed. Every man went straight for Blackbeard. When he eventually slumped to the deck he had suffered twenty cutlass cuts and five pistol ball wounds. Only fifteen of Blackbeard's crew survived, and thirteen were hanged.

Along the Atlantic coastline of America the sands and headlands must contain large quantities of Blackbeard's treasure. He has effectively concealed it to this day. His method was to go ashore with one seaman, and after the man had dug the treasure pit, to kill him, and bury him on top. Skeletons and treasure are still there for the finding.

To be caught by men like Blackbeard in the Caribbean meant death more violent than even the engulfing sea could contrive. Nor were the battles conducted between enemies on the formal rules of war the less fearsome, as accounts of the Battle of the Saints' Passage show. Perhaps the price paid was not too much. Admiral Rodney, in his sixties, ailing and yet not embittered by years of unfair treatment, is in the company of great Atlantic fighting mariners. He ensured that Gibraltar should remain the British bastion at the eastern gateway to the Atlantic; when he sailed to the cockpit of American waters he smashed the threat to his country's West Indian possessions.

The stretch of sea where the clash of the greatest European maritime powers of the eighteenth century took place lies between Guadeloupe and Dominica in the Leeward Islands. Sometimes the sea here can be treacherous, destroying. But in the days of April, 1782, when two fleets deployed in the leisurely way of sail to prepare for battle the weather was idyllic.

Britain's star was overshadowed. Her enormous territories in North America had disappeared; her supremacy over the ocean was within a trice of annihilation by France and Spain. On Rodney's ships depended the retention of Jamaica, the objective of the French invasion forces, and ultimately the safety of the entire colonial territories in the Caribbean. It was a dark age for the Navy, but it was the darkness before the golden dawn of global British sea power. The youthful Nelson was learning his profession on the North American station. With Rodney were men whose names typify British prowess at sea: Hood and Kempenfeldt. There was even a Drake there, descendant of the man who had taken the Cross of St. George through the world's seas.

Their adversary was an experienced tactician, who did honour to his name and country as he went down in defeat. The Comte de Grasse with reason felt assured of success. His own flagship, *Ville de Paris*, was probably the largest war vessel afloat at the time. She carried 104 guns. In all, de

Grasse had 30 warships, plus a horde of troop transports and ancillary craft. Rodney had gathered together thirty-six ships of the line. The preponderance in numbers did not actually indicate his superiority. In fire power his ships were supreme, not only because they carried some 200 more guns than the enemy, but in range and manœuvrability they were far better. Added to this was the virtue which had made British victories from Agincourt onwards: the discipline and speed of the men who fired the weapons. The broadside from a British sailing ship, fired at a matter of yards into a wooden wall, was one of the most terrible weapons devised for war, and the effect on morale was certainly as great as anything experienced in modern battle. The frightening inevitability of it, as the enemy crews could do nothing but watch the rows of portholes slide slowly towards them, until they spewed death and destruction, was something that only a merchant seaman who has watched a U-boat methodically manoeuvre into a satisfactory position to fire her torpedoes can know. Even then the odds on maiming or death were not so great.

In the Saints engagement the menace of the broadside was the greater because the decks of the French ships were crammed with men. The normal crews were augmented by the invasion troops and additional seamen taken on for later transfer to ships of their Spanish allies. In the battle the dead on deck became so numerous that they had to be thrown overboard because they were encumbering the fighting men. The result was a ghoulish scene, incongruous and terrible. War was still decked out with good manners, and as one ship cruised past her enemy, the guns of both crashing their inferno of shot into the rigging and hulls, each commander would politely salute his adversary, standing on deck for all to see. Between the battling ships, in the azure blue sea of a perfect spring morning, the sea was flecked with white foam and red blood as hordes of sharks fought and writhed for their banquet of human flesh.

But the reason why the battle is worth singling out from the many fascinating engagements which have taken place in those waters is that one sudden, unexpected action changed its outcome and re-fashioned the tactics of all future engagements. Above the smoke of battle Rodney's flagship the *Formidable* flew the signal to engage to leeward. It meant that, as always, the ships should sail in a pre-arranged procession, the rules of movement being known to both friend and foe with the familiarity of the moves on a draught board. The signal was still flying when the 64-year-old Admiral rejected the almost sacred laws of the Admiralty: the Fighting Instructions. He broke the line.

The *Formidable* turned at right angles, her guns on both sides engaging two ships simultaneously. There was immediate chaos. Some English ships followed the Admiral. Others behind and ahead imitated his move. Instinctive seamanship ensured that every commander disobeyed the signal still fluttering from the flagship and adopted the new and inexplicable tactics. Whatever chaos was in the minds of the English it was as nothing to the chaos in actual fact among the French enemy. Broken into groups, the fleet was chased off or pounded to pieces. From the Saints' Passage came the men and the tradition for victory at Trafalgar.

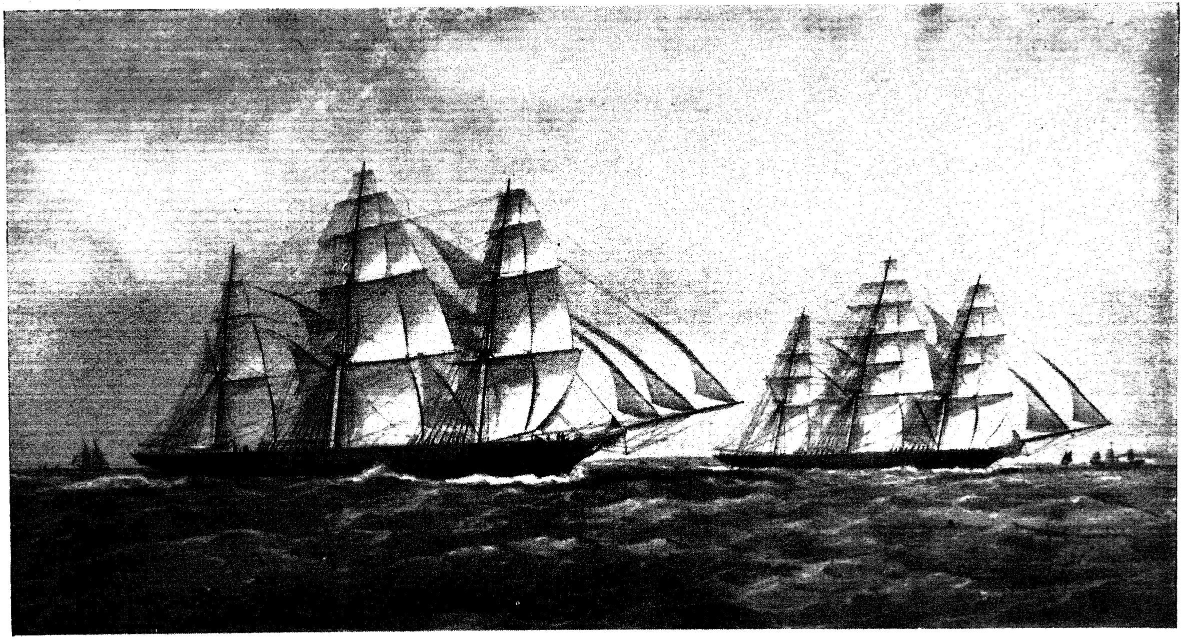
In that historic and decisive battle of the Napoleonic Wars there was a third force: the sea. Trafalgar was the culmination of a war which used the Atlantic as its battleground. In order to clear the way for invasion across 21 miles of sea in the Straits of Dover, Napoleon had his admirals sweep from the Mediterranean to the Caribbean. The enemy invasion fleets lay awaiting their chance in Toulon, Brest, Rochefort, Ferrol, Cadiz, Carthagena. For two weary years the British ships had watched and waited for a move. The problem was whether the Frenchmen would make a run for the Channel, sail clean across the Atlantic to draw off the English fleet for the protection of the rich colonies and strategic stations of the West Indies, or adopt a combination of the two.

On March 30, 1805, Admiral Villeneuve stood out from Toulon and made for the Atlantic. On April 9 he entered Cadiz, picked up seven Spanish ships and sailed for the West Indies; a powerful fleet of twenty-five vessels. Bad weather and the tardiness of information kept Nelson in the Mediterranean until May 7. By June 4 he was at Barbados, and the

French were ready to leave Martinique on the homeward passage. Not until June 13 was Nelson able to convince himself that the feint was over and a second chase across the ocean was needed. While his squadron pressed Eastward he sent a fast courier straight to England to warn the Admiralty that the French were on the way back and invasion was imminent. This ship actually overtook Villeneuve and enabled two blockading squadrons to engage the enemy as they approached Cape Finisterre on July 22. Apart from two ships captured, the engagement was indecisive. Three weeks later Villeneuve poked his nose out of Vigo and hurriedly retired to Cadiz when the wind changed to North and a neutral ship erroneously warned him of a large concentration just over the horizon.

That wind saved England from invasion, for at the time there was nothing worth worrying about between Vigo and the English Channel. The opportunity had gone. Napoleon once more turned his eyes Eastward, demanding that his Admiral should bring his fleet into the Mediterranean. Seldom has a sailor had such enmity from the sea as the worried and cautious Villeneuve, and the sea is never kind to the timid. As soon as he tried to obey orders a West wind made it impossible for him to work his ships out, though it enabled Nelson to range in readiness. Then, on October 17, when the breeze began to blow off the land he prepared to move. Promptly a dead calm arrived. On the night of October 18 the East wind freshened and at sunrise on the following day the forty ships hoisted sail.

It was a lovely autumn morning, the air clear and visibility at the maximum. It took seven hours for the vessels to clear the harbour, for the morning promise of a stiff breeze gradually died, and the ships had to be worked away by rowing boats. The next morning was squally with a freshening South-West wind. By the time Villeneuve was so far out that retirement was impossible, the wind lessened, veered to the North-West, and almost died. If the air was calm the sea had another story to tell. The long, green swell foretold to every sailor who knew the ocean that an equinoctial storm was imminent.



19. Two racing tea clippers leaving the Atlantic on September 6, 1866. The *Taeping* and *Ariel*, which left Foochow on the same tide, passing the Lizard, Cornwall, together. The *Ariel* docked in London twenty minutes ahead of her rival

encounter between *U.S.S. Chesapeake* and *H.M.S. Shannon,* outside Boston Harbour on June 1, 1813. The ships were fine specimens of two great shipbuilding nations; the men who manned them are high in the honours roll of both peoples.

The *Shannon* was a frigate of 38 guns, built just after Trafalgar. Her first important assignment was to reach the North Atlantic and the seas off Greenland to fight French frigates harrying British whalers. She met no enemy but the time was well spent in target practice. After refitting she joined the Newfoundland station, still with her same veteran crew, and under the command of Captain Philip Bowes Vere Broke.

When war broke out between the United States and Britain in the summer of 1812 the blockade imposed by the British Navy was fairly successful, but the fast, modern ships of the United States, though few in number, caused what amounted to defeat with their privateering. In the spring of 1813 the *Shannon* probed the approaches to Boston Harbour where three famous American vessels lay: the *Congress, Constitution* ("Old Ironsides"), and the *President.* These vessels slipped out to sea shortly afterwards, and the *Constitution,* built in 1797 with the intention of out-sailing and out-gunning any potential enemy, achieved a spectacular victory over the *Guerrière,* a 38-gun frigate captured by the British from the French squadron pursuing the whaling fleets. "Old Ironsides" held her fire until the *Guerrière* was a few yards off. Then she opened up with every gun she could bring to bear. The battle was over in minutes.

Broke on the *Shannon,* with the *Tenedos* as her helpmate, continued to patrol outside Boston Harbour. The American vessels were too fast to overtake. In the harbour was another frigate, the *Chesapeake.* The weeks went by; the *Tenedos* was ordered out to sea—some say to make the battle more equal but more probably to effect interception if the enemy came out at night and evaded the *Shannon.* The American was superior in the number of men and guns—a situation the American commander, Captain Lawrence, remedied a little by removing five guns. On June 1 Broke sent a message to his enemy, politely inviting him to come out and mentioning that he would like to be favoured "with a speedy reply. We are short of provisions and water, and cannot stay long."

The message was not delivered because the *Chesapeake* was already moving to sea, her colours flying. The breeze was slight, the sea smooth—ideal weather for the horde of pleasure craft which followed the *Chesapeake*, surely one of the few sea battles with an audience of trippers. It was evening before one aftergun on the *Shannon* fired at her enemy, sixty yards away. Then came a broadside. The *Chesapeake* slewed round, almost helpless, and drifted backwards until the ships struck. Broke led fifty men in a boarding party. The firing had lasted for eleven minutes, the entire engagement was over within another twenty. Broke had been almost scalped by a cutlass; Lawrence was dying from multiple wounds. There is little edifying in the history of the war of 1812—except for this bizarre but magnificent sea battle with its almost mediaeval ceremonial of gallantry and foolhardy valour.

When the great powers next watched a major clash in American waters the steamship was ousting sail, and its defeat was terrible and sad. The Battle of Hampton Roads is noteworthy because it taught the United States the importance of armour. It was a clash between two of the strangest war vessels which have ever gone to sea. The Confederates had been lucky enough to capture the *Merrimac*, a steam frigate, when they took the Navy Yard at Norfolk, Virginia. She had been set on fire by the dockyard workers but the hull was still intact.

Somehow the Confederates had to burst through the blockade maintained by a mass of Northern ships lying in Hampton Roads. They had virtually no war vessels and so they began hurried work on the *Merrimac*. The burned upperworks and top part of the hull were cut away until the sides were only just above water level. A strengthened deck was then built to take a squat armoured tower, sloped on every side and pierced with slits for ten guns. Railway lines were pressed flat and laid like a net over the deck and on the sides of the tower. The funnel came through the middle of the tower, which had a triangular extension at the front for fire control and piloting. At the bow was a heavy iron ram.

By March, 1862, the *Merrimac* (renamed the *Virginia,* though the original name was always used by the sailors of both sides) moved down the Elizabeth River. There was no time for a trial run. She sailed on her battle journey immediately. Fortunately for her crew, the day was dead calm. In the placid water she swayed from side to side, trying to turn round on herself, but managing to make about five knots downstream.

On the blockading Federal ships, there was, to put it mildly, consternation when the black monster was seen approaching. The crews were enjoying the unusually warm sunshine, hanging out their washing, and sleeping after their midday meal. Five small gunboats were co-operating with the *Merrimac.* They were too weak to make much impression, but they provided a target for the Federal shore batteries. Confederate guns on the other shore opened up. The battle was on.

The *Merrimac* took no notice whatever of the gunfire. There were direct hits which crashed on her armour with loud noise but simply bounced off. Not a gun on the *Merrimac* spoke in reply until she was fewer than 500 yards from the *Cumberland,* 30 guns. She scored a direct hit on a gun with her first shot. The *Congress,* 50 guns, lying next to the *Cumberland,* joined in the cannonade, and a hail of shot tore uselessly into the funnel and davits on the *Merrimac.* The sea monster's iron nose moved inexorably towards the *Cumberland's* hull, struck her near the prow, pulled out as the *Merrimac* reversed engines, and left a gaping hole. The *Cumberland's* commander refused an order to surrender, and almost immediately afterwards the ship sank.

With terrifying slowness the *Merrimac* began to turn and lumber towards the *Congress.* Her commander tried to run for shallow water where the 22 ft. draught of the *Merrimac* would prevent his assailant following, and he would have the protection of the shore batteries. The *Merrimac* could not despatch her with her ram, so she settled down to pound her to pieces with her guns. The trapped *Congress* surrendered to avoid futile loss of life. After her crew had been taken off red-hot shot set her ablaze, and that night she blew up. With the end of daylight the *Merrimac* retired to the Confederate side of the Roads, promising herself another victim in the morning: the Federal flagship *Minnesota*, aground when going to the aid of her sister ships.

Under cover of darkness a new ship arrived dramatically to turn the tables. She was as strange-looking as her adversary. John Ericsson, a Swedish-born American, had for long tried to get the great powers interested in his design for a monitor, an armoured ship with a small turret. He had offered his plans to France which had turned them down. When rumours came through that the Confederates were armouring the *Merrimac* he approached the U.S. Navy. His ship was quick and easy to build, consisting of an iron hull 122 ft. long, and an overhanging deck extending for at least 3 ft. at the sides and 20 ft. at bow and stern. The conning tower was at the bow, the gun turret in the centre and the funnel (removable in action) at the rear. All portions above water were heavily armoured.

The *Monitor* was completed in three months at Brooklyn, a large number of firms making her in sections. She went into service on February 25, 1862, eleven days before the *Merrimac*. She was actually en route for Hampton Roads before the *Merrimac* was ready, but the passage was slow, for she was continually in danger of foundering. Her crew heard the explosions of the *Merrimac-Congress* engagement but they could not reach the Roads till after dark.

In the morning, at first light, when the *Merrimac* lumbered across for her kill the squat line of the *Monitor* could be seen lying near the stranded *Minnesota*, smoke belching from her funnel. As the surprised Confederate sailors watched, the *Monitor* began to move. Other boats hurried out of the way as the first clash between ironclads began. The *Monitor* was much more speedy and manœuvrable, but her fire power was less. She tried to sink the *Merrimac* by methodically pounding at her armour to make the joints give way. The lattice system of the rail-armour provided resilience so that this was ineffective. Equally the *Monitor's* armour held despite a fearful pounding from the *Merrimac's* guns, and she evaded the greatest danger: attack by the *Merrimac's* ram. The Confederate commander then decided that he could use his ship to greater advantage by returning to his original plan, the destruction of the *Minnesota*. He retired across the Roads in a wide circle and ran aground. When she got afloat again it was realized that there was no chance of finding deep water for the approach to the *Minnesota* for the kill, and battle with the *Monitor* was resumed. The Northern vessel's conning tower was destroyed by a direct hit: her brain was gone. The fight had by then continued for six hours and the tide was running out. The *Merrimac*, water-logged through straining her keel when she grounded and short of ammunition, had to retire to avoid being left helpless and immobile.

The battle was over, a technical draw. The actual lives of these two ships were short, for the *Merrimac* was destroyed when the Confederates retreated from Norfolk shortly afterwards, and the *Monitor* sank during bad weather off Cape Hatteras in the last hours of that momentous year of 1862. But their defensive armour changed naval design and their action changed history. If Ericsson's plans had been turned down, the *Merrimac* would have dominated the American waters of the Atlantic, and the Northern Navy would have been slowly obliterated by systematic destruction. Hampton Roads turned naval warfare from an engagement depending on the elements and sailing skill to a clash of machinery encased in the skin of metal. Armour, horse power, and high explosive were to win the future battles of the Atlantic. Bravery was not enough. What calculated power could do is well illustrated in a Spanish fleet's agony during the war with America in 1898. The victors obtained their triumph at the cost of three casualties, one fatal. The Spanish lost all but 150 out of the 2,300 officers and men who manned her ill-fated ships. They were killed, drowned, wounded, taken prisoner. Yet these figures of an overwhelming disaster give an unfair picture of the Spanish bravery and of the quality of her ships, while the American forces can hardly be said to have shown unusual tactical brilliance. The victory happened because of the inequality of the forces arraigned.

The United States had planned an amphibious operation against Cuba from Key West, Florida. To prevent this and to reinforce colonial defences a Spanish Atlantic squadron was collected, consisting principally of four modern cruisers and a few destroyers and torpedo boats. In these days of reliable communication it is difficult to appreciate the problems which beset the American intelligence service in discovering where this fleet was. Rumour reigned unchallenged. The Spanish ships were seen as smudges on the horizon off New England; they were located making for the Horn and the Pacific; they had returned to Spain; they were in mid-Atlantic with the object of enticing the Americans to battle at a safe distance from threatened Cuba. As the best theoretical speed the fleet could manage was 20 knots it looked, if these stories were true, as if Spain had got hold of more ships and was roaming the Atlantic in several zones at once. In fact the fleet under Admiral Cervera was in the Caribbean, hungrily looking for colliers from which to refuel. After three weeks of wild excitement in America the ships were seen entering Santiago harbour. The ships were well hidden under the hills which run steeply to the water, and for a time the U.S. Navy doubted the reliability of the information. Not until a week later did ships arrive to blockade the entrance. After another month American forces were landed to storm the town, but the half-starved defenders, aided by torrential rain, held them off.

On July 2 Cervera got ready to move out. His crews merely added to the town's food problem and he realized that it was now or never to get through to Havana or some neutral harbour. It was high summer and a Sunday morning when the blockading fleet was roused to action by the sight of the smoke from the Spanish ships. First blood came to a steam yacht which had belonged to Pierpoint Morgan, the *Gloucester*, under Captain Wainwright. He cheekily fired at the cruisers and then expended his shells more usefully on the Spanish destroyers. Quick fire sent one out of control towards the cliffs and made another turn limping back to harbour. For six hours the battle continued, with ship after ship being forced to suffer destruction at sea or wrecking on the shore. Fire added to the carnage, for these ships were badly armoured. They seemed unable to retaliate with any success. In a graveyard stretching for sixty miles along the Cuban coast the long-held dominance of Spain ended in the blazing fires of her ships. The last to succumb, scuttled in the mouth of a little river, was the pride of the fleet, and a ship redolent of the memory of the great glory of Castile, of a new age in mankind's life. She was the *Cristobal Colon.*

CHAPTER VIII

THE GOLDEN AGE OF SAIL

At the end of the Napoleonic Wars the British Navy surpassed any other national fleet, or likely combination of fleets. For years afterwards this factor influenced ship design all over the world. In the United Kingdom ships were built for strength and durability—and the old tradition that merchant ships should be armed meant that they differed very little from the war vessels of the Navy. Other nations built purely for commerce—and for speed.

The largest English merchant ships of the day, the East Indiamen, of between 1,000 and 1,200 tons, moved slowly down the coast of Africa, following their traditional practice for the voyage of resting at night if weather and position permitted. The West Indiaman, half the size of her Eastern sister, was making the passage to the flourishing colonies of the Caribbean in much the same time as the ships of the Elizabethan sea hawks. On the North Atlantic route passages from 45 to 70 days on the Westward run were quite usual—and the vessels were often of only 250 tons. The Pilgrim Fathers would have noticed little difference in comfort or duration if their historic crossing had been delayed for 200 years. English shipbuilding was in the hands of skilled but conservative craftsmen. They built from instinct rather than with the application of science—which usually meant that they copied the plans of the previous ship on the stocks or at the best followed their inherited beliefs on maritime craft. It was a family trade, and father taught son, who made few innovations. But their relatives who had emigrated to the New World quite abruptly changed the situation. They had the love of the sea just like their kinsfolk who remained in Britain. They settled along the Atlantic seaboard of

America, and with the unlimited sources of soft wood their adopted land provided they built ships—seaworthy by those "instinctive" ideas but enlivened by functional design of the hulls. In the war of 1812 their ships and seamen had often given a very good account of themselves. They were sailed by excellent crews. It was the beginning of a situation which has continued until the present time. Good quarters were provided for the American crews, pay was at least double that prevailing on a British vessel, and the master invariably a well-educated man, compared with his British contemporary who, no matter what skill he obtained the hard way, had very slight technical knowledge of the theory of seamanship.

The great advantage of the American sailing ships in the first half of the nineteenth century was their speed. The East Indiaman beat the sea by strength and vanquished her enemies by her armament. The American vessel retreated from the waves' onslaught by increasing the length-beam ratio and relied on speed to evade any marauder which might try to attack her. By 1825 the Americans were building ships of up to 1,200 tons, capable of regular Liverpool-New York passages of forty days.

The world's mercantile interests were startled and impressed when the first American clippers sailed on ocean voyages in the 1840's. They were a development of the Baltimore vessels which had long been famous. Their designers managed to increase their size and yet retain their speed, particularly after the discovery of gold in California in 1847, which created a demand for a fleet of fast ships to round the Horn with the maximum payload. These vessels were superb, and maintained such a reliable and speedy service that the prospectors in California found it cheaper and quicker to send their laundry by clipper service to China rather than to search for someone in San Francisco to wash their clothes for them. When gold was found in Australia in 1851 the clipper owners were all ready to provide the hordes of prospectors with a ferry service. The majority of the emigrants to Australia came from the British Isles, and the trade overwhelmed the slow English vessels, so that, apart from the direct business the Americans obtained, they also made good profits by accepting charters from English firms.

The shipping companies of England meantime put in orders for American-built clippers. With favourable weather an American clipper could reach Liverpool in fourteen days from Boston, and on the return passage fewer than eighteen were quite usual. Furthermore, these clippers were of as much as 1,800 tons burden, compared with the usual 900 tons of the most modern English vessel. The American clipper could carry half again as much cargo and twice as many passengers as her English rival.

The golden age of sail marked by these clippers was short —a mere fifty years from 1840 to 1890. The clipper arrived when her machine-driven enemy was already in existence. She was a magnificent gesture of defiance which inevitably and inexorably gave way in the end. But before she did so, she had given new traditions for seamen to follow. There is something about these wonderful and beautiful vessels which seems to destroy all objective criticism, and perfectly intelligent people cite their decline and fall as it were a tragedy contrived by an unfeeling world of engineers and profit-grabbing shipping magnates. It is unlikely that many of the men who sailed the clippers regretted their passing. While there were scores who were proud to serve in them while life and skill endured, far more regarded the vessel running down to the Line with bunks flooded, green seas over the deck, no hot food for days on end, and a battle to be fought ceaselessly a hundred feet above the deck, just as a means to an end. They wanted a new life in new lands, and the clipper took them there faster and with better pay than any other ship afloat, including the "steam kettles" which, with good reason, most sailors both disliked and feared.

The clipper was born of American enterprise. Boston shipowners, attracted to the Indian trade by the fact that as foreigners they were not debarred by the monopoly of the East India Company, discovered a lucrative trade in importing Indian merchandise and re-exporting it. They found that the double journey across the Atlantic could be completed at a cost and in a time very competitive with the East Indiaman.

As early as 1816 the Black Ball ships were due to cross from East to West in forty days and from West to East in twenty-three as an average performance. More important, the Black Ball ships ran to a timetable. The custom of an intending passenger arriving at a port and having to find a ship which seemed to be nearly loaded was brought to an end by Black Ball enterprise. Once a month, on the tide, with hold full or half-empty, the ship set off on her regular Atlantic run. These American sailing liners not only cornered the cream of the passenger and freight business, they had fleets large enough to handle the emigrant trade which arose as soon as peace returned. In the first decade it meant carrying about 50,000 passengers a year; an average price for the journey was £3. 10. 0.

By the 1840's ships were large enough to cram 500 men, women and children between decks—the usual height being 6 feet. Three tiers of shelves served as bunks, and the only ventilation came from the hatches, battened down immediately the weather deteriorated. Water was provided and, if conditions permitted, the emigrants were allowed to cook their food on the galley fire. In practice, they might spend half the voyage stifled in a rocking and heaving dungeon, terrified by the crash of the sea above and the groan of straining timbers below. Few of the emigrants had much idea of the duration of the voyage, and often they had been deprived of their paltry savings by the hordes of brokers and suppliers who infested the ports of Liverpool, Bremen, and Rotterdam from which the emigrant ships sailed. On passages where adverse winds delayed a ship many never saw their Promised Land; still more were injured in the fights and accidents which took place in the "hell-pits" of the 1840 transatlantic packets.

But they were the tough, desperate people who created modern America. Their own attitude to conditions was certainly not one of horror as we feel it to-day. If they had possessed £15 or so they could have travelled in greater comfort—though no less danger—in the saloon accommodation. Here they would have enjoyed a small cubicle with a bunk and wash basin—the cubicles running round the edge of the saloon. The passenger would have brought his own bedding, and any other furnishings he required.

An emigrant went to the New World only because he was poor. The 'tweendecks accommodation was no worse than he was warned it would be. His fare yielded to the owners about the same income as a ton of freight, and so the human being was treated and given much the same space as a one-ton crate of machinery or eight sacks of flour. Though legislation has ensured that for the last hundred years minimum standards of food and accommodation have abolished the evils of those early transatlantic packets they also abolished the low fares. The American shipowners had not exploited the emigrants. They had carried them for the lowest possible cost. Without such facilities tens of thousands would never have even contemplated emigration.

The heavy traffic to California, followed by rivalry in the tea trade and the gold rush to Australia in 1851 produced the great name of clipper building—Donald McKay. Of the many wonderful ships that he built *Flying Cloud* and *Lightning* were the best. He built for hard weather and his vessels did not have the qualities in light air that some of the later British ships could claim. *The Flying Cloud* was of 1,783 tons register, and on her maiden voyage in June, 1851, she sailed from New York to San Francisco in just under 90 days. Captain Joe Cressy had stormy weather for most of the voyage. Her main mast, incidentally, was 200 feet high. Before she was destroyed by fire in 1874 this ship worked in the tea trade, as a British trooper, and on the England-Australia run. In her heyday she was unbeatable but, like most of the American clippers, her life at a real pitch of high performance was brief. The softwood used in the construction, though cheap and light, was not able to stand the stresses of hard driving; it also gradually became waterlogged.

Lightning will forever have its place in maritime history for making 24-hour runs on two separate occasions at an average of 18 knots. American enthusiasts point to this record as proof of the genius, rather than the technical skill, of McKay. Cynics have suggested it principally indicated the courage and seamanship of her master in gale conditions.

She was American-built and British-owned. Donald McKay laid her down in his yard at East Boston in 1853 to the order of James Baines, one of the most spectacular names in Liverpool shipping history. She cost him £32,000. Her bow was as concave as that of a modern destroyer. She carried thirty sails. Her first master was Bully Forbes, one of the toughest men of a tough age, whose slogan of " Hell or Melbourne " was sometimes the reason for disaster, for in his spectacular career he sank several ships. He took *Lightning* from Boston to Liverpool in 13 days 19 hours on her maiden trip. Passengers knew of Forbes' love of risk and many of the more affluent were chary of sailing with him. This was not typical of the clipper captains. Most of them showed unsurpassable skill in maintaining speed and ensuring safety—factors which always clashed. Of course some of these ships became casualties, destroyed by the elemental forces of wind, sea, and fire. The remarkable thing is that the majority of them survived to become coal hulks or to rest in a breaker's yard.

Of the books on the clippers and the men who sailed them there is no ending. In an age of technological supremacy, the stories of these sailing ships make an appeal which reaches a far wider public than in their heyday. Here it is obviously impossible to do justice to a story which started with the *Ann McKim* of Baltimore and ended with the great German ships of the early 1900's. Any youngster, tired of space ship and inter-stellar rocket fiction, will find fresh delights in the clipper stories which are now history. He should read, for example, of the exciting race which took place in 1866. The tea clippers left Foochow in a mass for the run home. By the time the leading vessels had rounded the Cape of Good Hope five were still in the running. They were *Taitsing, Fiery Cross, Ariel, Taeping,* and *Serica.* Three were over the Line within twenty-four hours of each other. Off the Cape Verde Islands *Fiery Cross* and *Taeping* were neck-and-neck. Then *Fiery Cross* was becalmed and *Ariel* gradually overhauled the leading *Taeping.* Both vessels forged into the English Channel at fourteen knots. Crowds on the Cornish and Devon coasts could hardly have shown such excitement since their ancestors watched the Armada. They took only twelve hours from Start Point to Beachy Head. *Ariel* docked in London twenty minutes ahead of *Taeping*; *Serica* tied up two hours later. Three ships thus docked on one tide, just as they had set out on one tide three months earlier.

The sweet witch of Robert Burn's poem *Tam O'Shanter* was the best-loved figurehead of any British clipper. Her cutty sark "o' Paisley Harn" clothed a lady who showed the way for a ship as immortal as Nelson's *Victory*. Her pointing hand was soon smashed by the seas she defied; the gathering of naked witches who danced attendance on her at the *Cutty Sark's* bows were removed by human hands to assuage Victorian modesty.

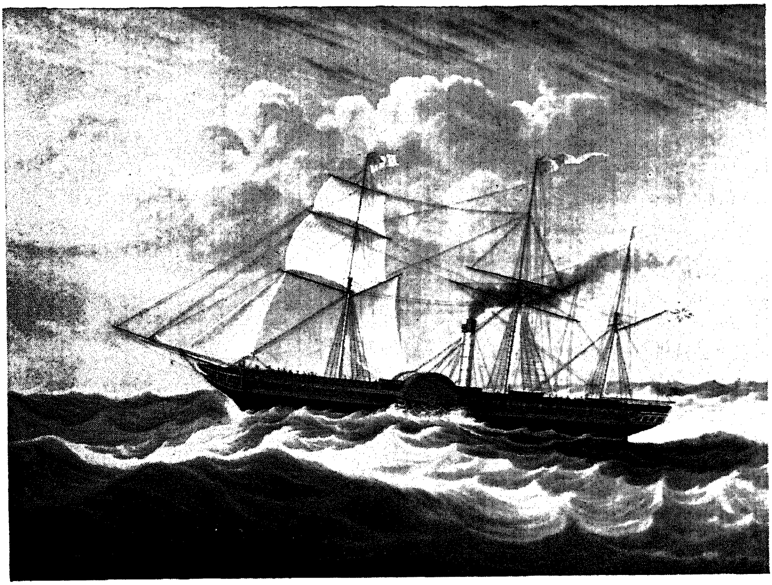
Built, as so many of the most famous British clippers were, at Dumbarton, she was of 963 gross tons and therefore by no means a giant in her birth year of 1869. But she was built as a racer to beat the *Thermopylae*. No ship ever made could transform wind into maritime movement as the *Cutty Sark* did, but on overall passage she was not a record holder when working as a tea ship. Her best was Shanghai to the North Foreland in 107 days in 1871. As a wool ship she found the boisterous weather in which she revelled. In 1887-8, with 4,500 bales of wool aboard, she made the Lizard from Newcastle, New South Wales, in 69 days (71 days port-to-port)—a magnificent improvement on her previous record average of 82 days on the Australian run.

Thermopylae, great rival of the *Cutty Sark*, was a little larger and a year older. On her maiden voyage she showed that a queen of sail had arrived. She broke every record possible. It was mid-winter and a favourable time for her passage South, and she crossed the Equator 21 days from the Lizard, and reached Australia 41 days later. No one can ever decide which was the fastest clipper ever built, for there was no measured track, and phenomenal bursts of speed for an hour, a day or a week cannot be used for comparison with an overall fast journey from one end of the world to the other. Nevertheless, by any standard, *Thermopylae* could put in a claim to the laurels.

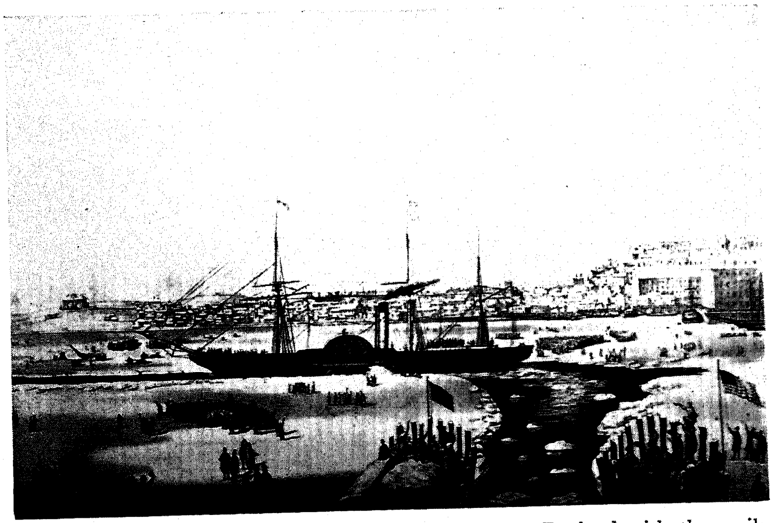
She could travel 350 miles in 24 hours, bring tea from Foochow to London in 91 days, travel from the Lizard to Hobson's

Bay in 62 days; she could race neck and neck with a crack mail boat *Empress of India*, and hold her own at 16 knots. She died, destroyed by gunfire when her useful life of 39 years was over, in the Atlantic waters off Portugal on October 13, 1907. No great ship, from the days of Carthage till now, has a greater claim to our memory.

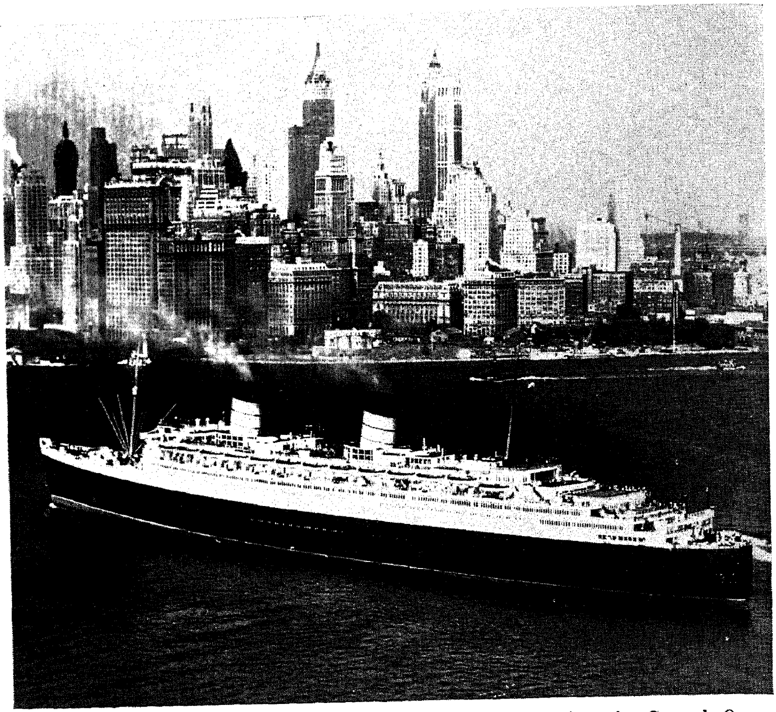
But the speed of the clippers was a relative thing. Their average speed on global passages was in the nature of six knots. The Suez Canal made this speed still slower in terms of delivery dates. Though there were—and are—men capable of manning them, there were few shareholders ready to shoulder their high wage bills and insurance. The steam engine callously chased the clipper from the sea.



22. In 1838, when she was launched at Limehouse, the *British Queen*, 1503 tons burden, was the largest vessel afloat. At her prow she carried a white figure of the young Queen Victoria. On her maiden voyage from Portsmouth to New York she crossed at an average speed of 8.4 knots



23. The people of Boston watch *Britannia* leave for England with the mails, February 4, 1844. They had dug a channel seven miles long through the ice by working continuously for forty-eight hours. Compensation from the British Post Office was politely refused



24. The world's largest liner arrives off the world's largest city: the Cunard *Queen Elizabeth* (83,673 tons) in New York Harbour

CHAPTER IX

THROB OF ENGINES

THE slow progress of the steam engine as a ship propellant is difficult to understand in a machine-minded age. A century and a half ago the idea seemed futile, impracticable, and uneconomic. There were good arguments in favour of all three views. English shipowners were perfectly content with the speed of sail; there was no reason why they should not be: in the Indian trade a complete monopoly existed, and for nearly two hundred years the Navigation Laws had provided protection against the competition of better shipbuilders in America and France. Wiser people than shipowners regarded a steam-engined ship as an impossibility. "The proposal to drive a ship by a steam engine," announced the President of the Royal Society in 1800, "was a very pretty plan, but there was just one point overlooked, that the steam engine requires a firm basis on which to work." If the experts had disproved the idea to their own satisfaction, who were inventors like John Fitch of Pennsylvania or Patrick Miller of Edinburgh to think otherwise and try to build a powered boat? Fitch committed suicide in the face of hopeless obstacles. Symington horrified the shareholders when his boat, churning the water on the Forth and Clyde Canal, damaged the banks. He, too, "lost interest". The steam engine was, of course, uneconomic. For decades afterwards owners had cause to regret its appetite for fuel, a costly source of power compared with the ocean winds.

Fortunately for maritime progress, Robert Fulton, an uninhibited Pennsylvanian who came to England to study painting in 1786, learned all he could about the steam engines England was making. He went to France and tried to sell Napoleon an idea for steam-driven invasion rafts, and later in the easy comings and goings of men of science during the Napoleonic Wars, crossed to Britain and looked up Symington. At Fulton's request the canal tug *Charlotte Dundas* was cleaned up and given another trial run. Then Fulton returned to America, taking an engine built by James Watt with him. In 1807 his 150 ft. long *Clermont*, known to New Yorkers as "Fulton's Folly", began the first commercial steamer service in the world, running regularly between Albany and New York at 4½ knots. Fulton obtained a monopoly for passenger steamships on the waters of New York State and made a lot of money. It was five years before another steam ferry began to ply on an Atlantic coast. In 1812 Henry Bell, a Glasgow engineer, launched his 40 ft. *Comet* and started a passenger run between Glasgow, Greenock, and Helensburgh. Steam-engined paddle wheels were churning waters which tasted of the Atlantic, but they still avoided the ocean itself. The whole concept of the steamboat at that time was to provide a service in confined waters or against river currents. In Britain the steam ferries appeared on the Clyde, Mersey, and Thames. In America there were more than 300 navigating the country's rivers by 1833. Only tardily did they venture farther seawards, and their first advance was in the Atlantic waters which run into the sea between the British Isles to form the Irish Channel. By 1819 a paddle steamship, *Waterloo*, was running a bi-weekly service between Belfast and Liverpool, aided of course, by sails. In the same year the fishermen of Ireland, though accustomed to the smoke of steamships in the Irish Channel, did not expect the same sight on the Atlantic side. On June 17, some smacks off the coast hurried back to their harbours with reports that a large ship was approaching—on fire. Shortly afterwards this three-masted vessel put in at Kinsale with nothing the matter beyond a little battering from the sea and a lot of soot everywhere. She was the *Savannah*, the first ship to use steam power to help her cross the Atlantic. In general appearance she was a pretty ship, built at Corlears Hook, New York, by Francis Fickett, who designed her to provide a fast sail-packet ship for the France-America run. After launching she was altered to take an auxiliary engine, a single-cylinder contraption which managed to work with a pressure less than 1 lb per square inch above atmospheric. It drove collapsible paddle wheels alleged to propel the ship in calm water at 4 knots. The patriotic citizens of Savannah who had financed this enterprise discovered that trade in post-war Europe was so bad that neither freight nor passengers would justify running the ship. Without passengers but with 75 tons of coal and 25 cords of wood she sailed from Savannah to be sold in Europe. Actually on the voyage of 27½ days between her home port and Liverpool steam power was used only for a total of 85 hours.

There were no buyers in England, and partly for reasons of prestige and also because Russia was known to be a generous purchaser of scientific novelties the gallant little *Savannah* was taken into the Baltic to St. Petersburg (Leningrad). No buyers were found and under sail she returned to America where she was auctioned. The engines were removed and the ship had a brief year as a packet ship between New York and Savannah until she was wrecked on Long Island in a November gale. Her owners seem to have been quite unaware of the historic nature of her adventurous but unremunerative life, and few records of her remain.

A somewhat similar bizarre life marks the second steamship on the Atlantic. She was the *Rising Star,* built at Rotherhithe on the Thames in 1820. Unlike the *Savannah,* she was designed for steam propulsion from the beginning, the engine installation being the business of Lord Cochrane, an enthusiast for steam power. As she was intended to serve as a battleship in the Chilean revolution she was sturdily built with two decks for guns. The Maudslay engines produced 70 h.p., driving paddles which, under test on the Thames in June, 1821, drove the ship at about 6 knots. On her passage to Valparaiso she began to draw water when in the Bay of Biscay, and ran before a South wind to Cork, where she was laid up for repairs. By the time she reached the Pacific the war was over, and she was sold. The remainder of her career was undistinguished, but she remains the first steamship to sail on the Westerly run in the Atlantic, and incidentally, the first to reach the Pacific.

A third ship which deserves a place in the list of pioneer steam vessels is the *Curaço,* a glorified yacht ordered by a company which hoped to use her for a fast packet service between England and the West Indies. She had three masts and a funnel nearly as tall as the mizzen, and there was an ingenious "free wheel" device so that it was not necessary to remove the paddles when the ship was not using the engines. Through a fortunate enquiry from the Netherlands Navy, the owners sold the ship soon after it was launched at Dover, and she was put on a courier service between Holland and Dutch Guiana. Although she averaged 6 knots and sometimes sailed under steam power for a week and more at a time, there were exasperating problems for the crew. At intervals the fires had to be doused so that the salt in the boiler could be cleaned out. When the fuel load decreased, the engines were stopped while the crew removed and replaced the paddle floats because the increased freeboard pulled them out of the water.

Meanwhile, expansion of shipping activity was taking place rapidly in the Irish Channel services. Ireland's large population moved steadily out to be absorbed in the factories of England and Scotland. Companies to benefit from this business sprang up by the dozen—to tempt shareholders they tried to work the word "steam" into the title somehow. Some faded quickly away. Others fought for survival in any manner possible but improbable. One was the City of Dublin Steam Packet Company, as ebulliently Irish as the town of its origin. When it entered the fray to share the traffic business across the Irish Sea in 1824 the company must have been spoiling for a fight, for no accountant would have forecast profits. Rival firms were already in the midst of cut-throat competition which enabled the happy voyagers to cross from one country to another for 2s. first class. By the time the City of Dublin Company had been in existence a year, deck passengers went free. Profits, even existence, were forgotten in a frantic war to beat the rival. The new little company did quite well, as regards turnover, by carrying passengers for 6d. a head from Liverpool to Dublin, and carried on even though it had two big companies, a Government-financed mail service, and a host of one-man one-ship businesses in competition with it. The Dublin Company's packets were available for any business where freights and passengers could be picked up. Vested interests which created difficulties about berthing, arranged untoward accidents, and hi-jacked the crews, were just the sort of adversaries the directors loved to meet. In 1837 the company managed to find the money to order a steamship. She was a paddle steamer of 617 tons, rigged as a barquentine, built of wood, with side-lever engines which developed 400 indicated horse-power. The accommodation was described as capacious, and allowed for 80 passengers. She was built for the Irish ferry, but with the chance of a charter for a new firm, the Transatlantic Steamship Company, she was hurriedly prepared for a voyage to New York. The furnaces were built to burn compressed peat as well as coal, and with the engineers' report that she needed 6¼ lb of coal per indicated h.p. per hour, she was loaded with as much fuel as she could carry. Then with 32 intrepid passengers the *Royal William* left Liverpool on 5 July, 1838, fortunately experiencing good weather all the way. The passengers could dip their hands in the sea by stooping at the deck side. She arrived in New York after a run of just under twenty-four days. This remarkable little ship was not only the first to cross the Atlantic from Liverpool; she was also the smallest that ever steamed the whole distance between the two continents. During the next eight months she made two more round trips without untoward event, and returned, full of prestige and honours, to her real job on the Irish ferry.

These transatlantic voyages were still regarded as something of a stunt. A few more months were to pass before a ship built for the job marked the real birth-year of the Atlantic steam ferry. On shorter voyages the steamship was already established. The intrepid City of Dublin Steam Packet Company had a regular service between Ireland and France, most of the ships going as far as Bordeaux, from 1828 onwards, and two years before this General Steam Navigation were running steamships on the historic England-Portugal route. On the cessation of John Company's monopoly in 1814 commercial interests in both India and Britain carefully studied the requirements of the marine traffic between these countries. With prize money totalling 32,000 rupees shipbuilders began constructing ships for a contest for two round voyages between England and India, each single journey to be completed in fewer than seventy days. The *Enterprise* was the first powered vessel to follow the track of Vasco da Gama and round the Cape. She left London in August, 1825, and took nearly four months on the passage to Calcutta—an effort which did not enhance the prestige of steam.

There was, however, a new force emerging in British shipping circles. A young man with Viking blood in his veins left his cottage in the Shetlands to join the Navy. With the end of the war against Napoleon, Arthur Anderson came to London, where he began slowly to starve in the traditional manner of the young seeking their fortune. In this case the *deus ex machina* arrived in the shape of a business friend of his uncle who in time handed twenty-four-year-old Anderson his daughter in marriage and a job in a shipbroker's office. The broker's name was Wilcox. The eventual partnership of Wilcox and Anderson was a struggling infant which grew into the Peninsular and Orient Line, formed in 1840 with a capital of £1,000,000. Before this, in 1837, Anderson and his more staid partner had a fleet of steamers serving London, Falmouth, Oporto, Lisbon, Gibraltar and Malaga.

In that same year a vessel neared completion on the stocks at Bristol which was intended to extend a railway service from London to New York. The irrational genius of nineteenth-century engineering, Isambard Kingdum Brunel, son of a French refugee who fled from the Terror to New York, had encountered certain objections from his co-directors when outlining his plans for a railway from Paddington to Bristol. Brunel, then aged twenty-nine, met the objections by describing his scheme to extend the Great Western Railway communications across the Atlantic. It was an idea which met with little enthusiasm among men studying the costs of a railway which needed tunnels and suspension bridges instead of cheaper embankments, but Brunel began designing his transatlantic packet the same evening. The plans for the *Great Western* took just over two months. The directors accepted them and work began at the Patterson shipyard in Bristol. She was, even by to-day's standards, a wonderful ship. Brunel built the hull with the strength of a battleship, mixing iron with oak so that the 205 ft. keel could withstand the stresses of the Atlantic rollers—waves which Brunel knew and hated, for he was a chronically poor sailor. The passenger accommodation was far and away the most luxurious of any ship of the time. The saloon, a room of 75 ft. in length by 21 ft. in width was designed to provide for the daily pleasures and comfort of 120 first-class passengers. There was also room for up to 100 lower-class passengers and a crew of sixty. Her engines of a nominal 450 horse power, were served by four boilers, each with three furnaces.

The *Great Western* was the wonder of the shipping world. People travelled from miles around to catch a glimpse of her after she was launched in July, 1837. All England, not least financiers and shipbrokers, awaited expectantly her maiden voyage, announced for April 7, 1838. A fire on board shortly before the great day did not delay the start, but the weather did. The *Great Western* was compelled to lie to in the Bristol Channel until April 8.

This delay was fortuitous for a rival firm, the high-sounding British and American Steam Navigation Company, which had been formed principally to challenge the Brunel enterprise. They had commissioned a Limehouse firm to build a ship bigger than the *Great Western,* quite as robustly constructed, and with more powerful engines. In both theory and practice she was slightly faster, but unfortunately for her owners the Scottish firm who were making the engines went bankrupt, and the contract had to be transferred to Napier. The chance of stealing some of the *Great Western's* thunder seemed to have gone.

Hurried enquiries for a charter ship among shipbrokers in London, Liverpool and Dublin produced only one steamship —the *Sirius*—which was really hardly large enough for her normal run from London to Cork. However, the directors of the British and American Steam Navigation Company were determined that something under their ownership should cross the Atlantic that spring of 1838, and they announced that the *Sirius* would sail from Cork on April 2—five days before the scheduled departure of the *Great Western*. Nearly seventy heroic passengers booked a passage, and, with a crew of thirty-five, conditions, to put it mildly, could hardly have been luxurious in this ship of a mere 700 tons register.

The owners wisely selected a Royal Navy man as master. Lt. Roberts was a sailor of the old school, who put his ship before his crew, and the passengers a long way behind both. She reached Cork from London without mishap and there took on her passengers and coal. Bad weather delayed her for two days, but she set off on April 4 in the teeth of a Westerly gale which was to delay the *Great Western* in Bristol for a precious twenty-four hours. The terrified passengers sent a deputation to the captain suggesting that the vessel was overloaded and demanding that some of the coal should be jettisoned. The captain brusquely informed them that if any lightening had to be done it would be in the shape of the passengers. This effectively eliminated their complaints, but the crew let it be known that they considered the voyage the action of a madman. Lt. Roberts continued to drive the *Sirius* Westwards, keeping a gun ostentatiously handy for the crew to see. The boilers were designed to consume 24 tons of coal a day. They consumed more, and before the American coast came over the horizon Roberts had ordered most of the furnishings and some of the wooden bulkheads to be burned. The *Sirius* steamed into the North River with the last head of steam her furnaces could produce late on April 22, after a passage which averaged 6·7 knots. She received a typical New York welcome, which was repeated early next day when coastguards reported another huge steamship on the horizon. The *Great Western* had lost the race by a matter of hours, though, of course, her speed was much greater—8·8 knots and a saving of more than three days on the longer route. But the New York crowds admired the cheekiness of the little *Sirius* more than they were impressed by the majestic performance of the *Great Western*. When the dour Lt. Roberts took her out on the return voyage a week later thousands cheered her; there were no sirens as for the *au revoir* of to-day. Instead the Battery gave her a salute of seventeen guns, an honour never previously accorded to a merchant ship.

The *Sirius* repeated her double crossing once more before she returned to the coastal trade. She came to grief on a reef in 1847 and was lost. The *Great Western,* though victory was snatched from her in the big race, did more to prove the reliability of steam. She made sixty-four uneventful crossings, and then, under the pennant of the Royal Mail Steam Packet Co., thrived for another ten years on the Southampton-West Indies run. She was broken up at Vauxhall in 1857, passing the great hulk of her young sister, the 12,000 ton *Great Eastern,* on the stocks at Millwall, as she sailed gently to her graveyard.

The laurels were securely in the hands of Britain, due mainly to her unrivalled position as an engineering country and of finance to build ships which cost up to three times as much as a vessel propelled by sails. The American reply to the steamship was the clippers, superb ships which could, and often did, outclass the British steamers on speed as well as pay-load. The thumping, groaning steamship was regularly insulted by a clipper, glorious in her dress of canvas sweeping past at twelve knots, with a tow rope derisively trailing at her stern.

Small wonder that with the supremacy of the clipper the New World tended to forget that it could claim to have sent the first steamship to traverse the Atlantic under steam alone, although there might be reason to infer that sail was temporarily used. The schooner-rigged *Royal William* (the first pioneer of the Atlantic to have that name) was built as a Canadian coaster for the company owned by Samuel Cunard and his brothers. If she had not taken sufferers from cholera on board in 1832 she would doubtless have ended her days without ever tasting a mid-ocean swell. But the quarantine which followed the cholera trouble put the owners in financial straits and it was decided to recoup by selling the ship. She sailed from Pictou, Nova Scotia, on August 18, 1833, with seven passengers. She had two engines—a fortunate situation when a gale off Newfoundland damaged the starboard engine crankshaft. For ten days she ran on one engine while repairs were put in hand. The *Royal William* reached Cowes, Isle of Wight, on September 6—an excellent run, in the circumstances, of nineteen days. For the sake of the record, there may have been times when the ship depended entirely on her sails, for the salt had to be cleaned from her boilers every fourth day, and the job took 24 hours. While one engine was out of commission, therefore, during at least half of the voyage, no engine power could have been available. Her participation in the ferry was not repeated, for she was sold to Spain and converted into a warship.

The emergence of efficient steamship traffic on the African run was in 1857, when the Union Company inaugurated a regular service. The owners had a flourishing business organized to operate a small fleet of colliers between the South Wales coal ports and Southampton. During the Crimean War their five ships were commandeered for war duties, and in the year of their return to peace-time use the mail contract to Cape Colony was open to bidders. The Post Office stipulated a monthly sailing by a vessel not less than 530 tons register and capable of completing the trip between England and the Cape in forty-two days. The Union Company converted the *Dane*, a three-masted schooner-rigged collier, and she sailed in September, 1857, with six passengers, some cargo, and the mails. Although she was capable of 7½ knots, with all her sails the passage took forty-four days. This was, however, a great improvement on most of the times for traffic on this difficult Atlantic route.

By the time of the discovery of the Kimberley diamond fields in 1869 the company was running a fortnightly service, and although the Suez Canal, opened in the same year, deprived it of some Eastern traffic, the rush to Africa brought both prosperity and competition. Most of it was from mushroom companies which sprang up and died in the span of a few voyages. The greatest rival was the Castle Line of ships started by Donald Currie, who had gained his experience with Cunard. Deliberately Currie chose Dartmouth as his starting place in England so as to gain an advantage over the Union mail steamers. The three days' start was invariably improved by the superior performance of a Castle ship, which usually arrived ten days ahead of the mail boat at Cape Town. In 1876 Currie's efforts brought his reward: he shared the mail contract. From then on, the Atlantic off the West Coast of Africa became an exciting race track. The crews of the Union ships were disciplined with the strictness of the Royal Navy, and the vessels were kept immaculate even in the weather conditions they invariably encountered. The Castle ships, on the other hand, were sailed under free-and-easy conditions where pride in seamanship was the main thing that counted. Premiums were paid to bring the voyages below contract time, reaching £150 a day at the height of the battle. At the zenith of this rivalry the Union's *Scot* took the record with a Southampton-Cape run of 14 days 19 hours. After twenty-eight years of competition the Lines amalgamated.

The lovely livery of the Castle ships—lavender hulls and red-and-black funnels—became the badge of the Union-Castle Line, and the ceremony of amalgamation took place, not in a Leadenhall Street boardroom, but amid scenes of patriotic excitement in Southampton Water, when *Dunottar Castle* and *Gaika,* packed with troops embarked for the Boer War, lay side by side and at a given signal broke the new flag at their mastheads.

While the story of the development of steamships on the England-Africa run has been overshadowed by the greater battle which had started by the Blue Riband contest, the effects of the Union-Castle rivalry were probably more profound on the British Empire. The linking of the colonies of West and South Africa with the Mother Country by the reliable and fast service which these ships provided was of tremendous political and social importance. It occurred, thanks to the insistence of the British Post Office on a fast and reliable mail service. The same requirements were the fundamental cause of the competition and efficiency of ships in the North Atlantic.

CHAPTER X

THE BATTLE OF THE GIANTS

With justification, the shipping interests of Britain took little notice of the first transatlantic voyages where steam provided auxiliary power. The steamship was uneconomic, and its slightly superior speed in calm or adverse weather certainly did not outweigh the disadvantage of carrying vast quantities of coal, cutting down cargo space, and employing extra hands. The contest for the Blue Riband, never in any tangible form until a large piece of silverware was accepted by Mussolini as inspirer of the *Rex* (he promptly had the trophy taken away by the *Normandie*), really began when the British Post Office dangled an enticing reward for anyone who could provide a fast and reliable ferry service winter and summer alike.

For some forty years the Post Office, aided by zealous members of the Customs and Excise Department, had been stopping outward-bound ships and relieving them of any letters found on board, the reason being of course, that the G.P.O. had a monopoly on communications. Nobody in the Post Office of the time knew or cared much about the efficiency of the official overseas letter service, but the department was being acutely embarrassed by shoals of impounded letters which had to be opened and returned to the senders so that they could be duly paid for as a letter sent abroad through the legal channels instead of on the infinitely faster and cheaper private systems. Nobody benefited by this arrangement; least of all the Post Office.

In the 1830's there was a new spirit abroad in postal matters, due to the inspiration of Rowland Hill, then busy on his penny post scheme. In 1837 the unfortunate shipowners found a new law had been quietly passed by which a

Post Office official could march up the gangplank, place a mass of mailbags in the care of the master and order him to deliver them as quickly as possible. Refusal meant a fine of £200. The ships' masters made the best of the situation. Very soon an aura of corruption was abroad, the port agents of the Post Office seemingly striking a neat bargain by which masters who did not want to be bothered with mail never experienced the ominous sight of a postman marching on to the deck, while inefficient and slow vessels, hard put to it to find cargoes or passengers, staved off bankruptcy with a lion's share of mail carrying. Sometimes ships were hired by the Post Office in order to get the mails away to the New World, and even if there were no passengers or cargo, they weighed anchor and were away. The fact that hire was for a considerable term, and the Post Office paid all wear and tear and miscellaneous expenses, attracted every racketeer in the shipping business. An official enquiry pointedly reported, when investigating the astronomical costs involved in the Falmouth packet service, that the management had "become an unbounded source of expense and speculation". It was a mild statement of the facts. In many cases the ships were actually owned by the officials who hired them, and one civil servant's "emoluments" from the service netted him £50,000 in the course of seventeen years.

With the *Great Western* on the Atlantic route, the Post Office thought it had solved its problem of finding a reliable service. It ordered the company to carry the mails in return for the usual gratuity to the master. The company, faced with bills on every side, refused, adding that they would consider it on the basis of half the cost of postage. The Post Office regarded this as daylight robbery and made a final offer of £200 per trip. Presumably all shipping interests in this country realized that this was a showdown, and they stuck together. The offer was rejected. No one else would take it up.

The folk who suffered most from this impasse were the inhabitants of the New World. Britain was the focal point of the economic system of North America, and to a great extent the Southern Continent as well. Regular and speedy mails were vital for trade. Consequently business men on the Eastern seaboard of Canada and the United States heard with increasing annoyance of the breakdown in the mail services.

The man who did something about it was Samuel Cunard, son of a Pennsylvanian Quaker who had gone to Nova Scotia when the American colonies took their independence. Cunard, at that time fifty years old, was a wealthy shipping magnate, owner of forty vessels in the coast trade, and a mail carrier between Newfoundland, Boston and Bermuda.

Despite his prestige, no financier in Halifax or Boston would listen to Cunard's pleas for money so that he could buy a steamship or two and get the mail contract. He came across to England, and vainly tried the shippers of Liverpool. Then he visited London and badgered the City. It was the same old story. Atlantic shipping was a cut-throat gamble which did not interest them. He travelled North again, and in Glasgow he met Robert Napier, the shipbuilder. He in turn introduced the Nova Scotian to George Burns and David MacIver, partners in the famous firm of J. and G. Burns. Though both men were taciturn and non-committal at the meeting, their manner belied their thoughts. Within a few days the British and North American Royal Mail Steam Packet Company was formed with a subscribed capital of £270,000. The three directors had a talk with Lord Melbourne, the Prime Minister. The matter was ostensibly about mail contracts, but in fact about defence arrangements. Melbourne demanded three ships, built so that they could carry guns if needed, and so constructed that they could quickly be transformed into troopers. Cunard and his colleagues left Whitehall with a mail contract for seven years at £55,000 a year. The date of the signing of the agreement was May 4, 1839, and the battle of the Atlantic Ferry was on.

There was, of course, the rather urgent matter of finding some ships. Cunard had already placed tentative orders for three vessels to be completed within a year at a total cost of £96,000. In view of the certainty of £383,000 revenue in the following seven years it was a useful proposition, and not even the canny investors of Clydeside could complain about developments so far. Subsequently the Admiralty said they would like four vessels on the mail run, in consideration of which the subsidy would be increased to £81,000 a year.

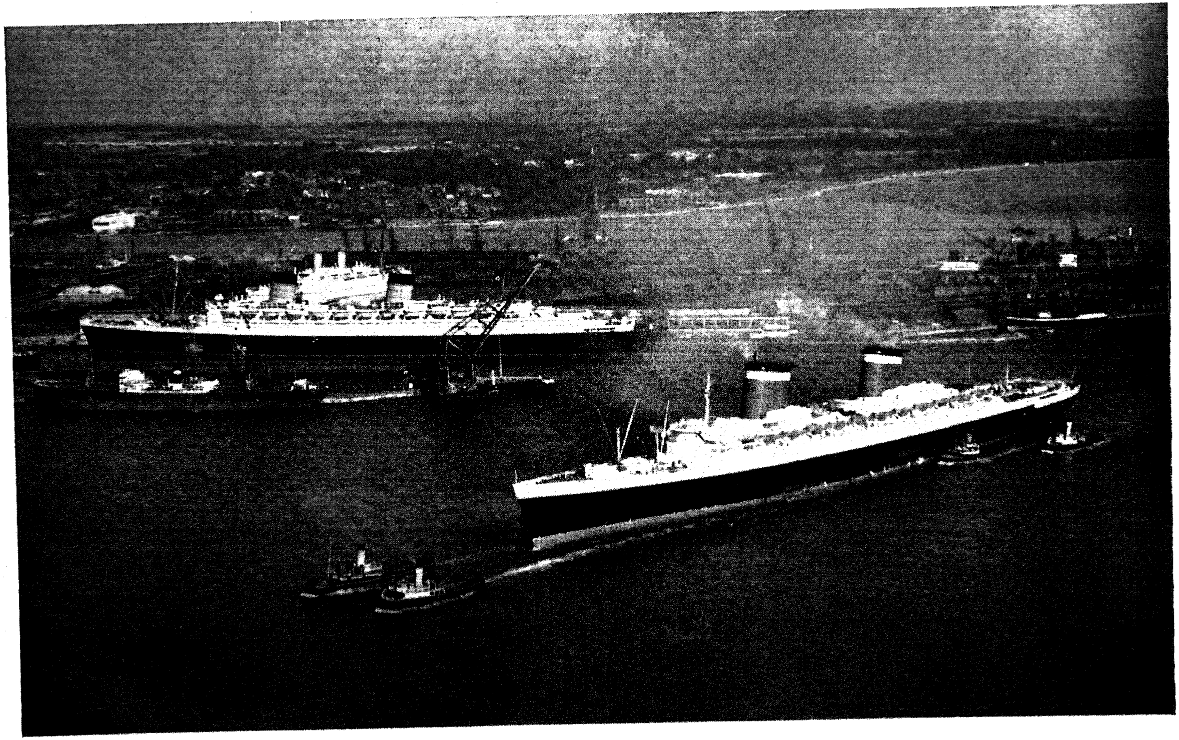
Cunard was astute enough to refuse. He realized he was in a very strong position if a British Government Department, at a time of severe depression, spontaneously offered a relatively large sum for a quite minor increase in the services he provided. After discussion with his partners Cunard went to the Admiralty and suggested to their Lordships that he would fulfil all commitments they requested and save the British taxpayer £11,000 a year into the bargain. His only stipulation was that his masters would be in sole control of the vessels under their command, and freed from the supervision and alleged co-operation of naval officers. However this suggestion might reflect on Her Majesty's officers, the Admiralty considered it favourably and Cunard got his way.

The *Britannia* was Cunard's first steamship. It inaugurated the race for the Blue Riband. Built at Greenock, she was a two-decked, three-masted barque of very pleasing appearance. She left Liverpool on her maiden voyage on July 4, 1840. It was a perfect day, and her golden figurehead scintillated in the sun as she rode at anchor in the Mersey. Her passengers were placed aboard from a tender "owing to her immense size", as a press report had it at the time. To the accompaniment of loud cheering and the mooing of the cows on deck, taken along to provide fresh milk, Cunard's subsidized flagship churned down the Mersey, the paddles threshing the water at sixteen revolutions a minute. She made Halifax in 11 days 4 hours. Samuel Cunard was on board. As the ship hove into sight at Halifax, cannon boomed and the waterfront was decorated with flags. Not to be outdone, the citizens of Boston, where the ship went next, honoured Cunard with a banquet attended by 2,000 people. The principal toast was "Mr. Cunard's line of steam packets, the pendulum of a large clock which is to tick once a fortnight; the British Government has given £50,000 for one of the weights, and may the patronage of the public soon add another!" Thus the creaking metaphor was harnessed to the stockbrokers' publicity efforts. Through it, or in spite of it, the public's patronage was easily obtained. A steady stream of carriages, messenger boys and footmen besieged the house where Cunard was staying, and within twenty-four hours of that clarion call at the banquet Cunard had 1,800 invitations to dinner from Bostonians who hoped thereby to get in on the ground floor of this profitable new venture.

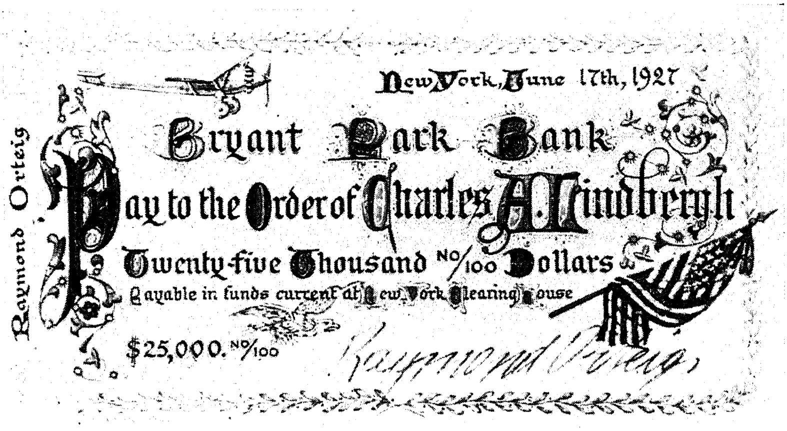
The sister ships of the *Britannia* were *Acadia, Columbia,* and *Caledonia.* They were neither big nor spectacular. They were not particularly comfortable. The staterooms, as Cunard called them, were the sole gesture to luxury, and they consisted merely of rather gloomy cupboards fitted with shelves. Charles Dickens, a landsman if ever there was one, was not impressed with his life aboard the *Britannia* as a distinguished passenger:

> "Before descending into the bowels of the ship, we had passed from the deck into a long and narrow apartment, not unlike a gigantic hearse with windows in the sides; having at the upper end a melancholy stove, at which three or four chilly stewards were warming their hands; while on either side, extending down its whole dreary length, was a long, long table; over which a rack, fixed to the low roof, and stuck full of drinking-glasses and cruet-stands, hinted dismally at rolling seas and heavy weather."

If he had descended still further he might have realized why a Cunard ship was loved by more knowledgeable people than he. In the engine room he would have seen engines almost as powerful as those of the much larger *Great Western.* They were an early triumph for a man whose name should join Cunard's as one of the greatest in the story of the Atlantic ferry: Robert Napier. These engines enabled the Cunard ships to gain a reputation for reliability. The clock of the flowery eulogy at that Boston banquet worked with wonderful regularity and safety. "Cunard never loses a life", nervous ladies were told by their equally nervous escorts. Only the very worst that the Atlantic could do changed the even rhythm of the Cunard ferry timetable. And when weather conditions promised a break in the schedule human



25. The present Blue Riband holder, the *United States*, in the Solent



New York, June 17th, 1927

Bryant Park Bank

Pay to the Order of Charles A. Lindbergh

Twenty-five Thousand No/100 Dollars

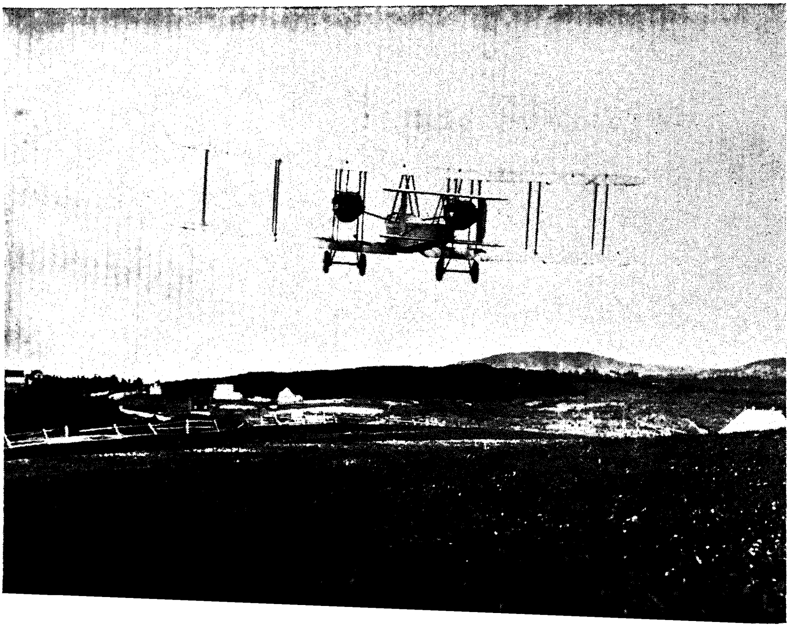
Payable in funds current at New York Clearing House

$25,000. No/100

Raymond Orteig

Raymond Orteig

26. Stimulus to the early Atlantic air crossing attempts was the offer of various large money prizes. This was part of the rewards which accrued to Charles Lindbergh: the 25,000 dollar prize awarded by Raymond Orteig for the first New York-Paris non-stop flight



courage and enterprise thwarted it. No better proof of the value of reliable contact with the Old World to the people of the New can be found than that which happened in February 1844. The weather was so severe that while the *Britannia* was tied up at the wharf the water froze to a depth of six feet. Even seven miles out to sea ice was two feet thick. The word went round Boston that the mails were held up—possibly for weeks if a thaw did not come until spring.

The news electrified the town. The frail and the old sent money as their only way of helping. The more able-bodied, rich and poor, trooped down to the harbour. Horse ploughs gouged shallow furrows in the surface. Then the people of Boston began the fantastic task of sawing the ice into great slabs until a passage one hundred feet wide and seven miles long was cut. Those who were too weary to work the saws any longer stood shoulder to shoulder on the edge of the previously cut block until the mass tipped up. Then grappling irons were fixed to the tipped-up side and with horses, legions of small boys, and many women, the block was forced under the surrounding ice. The people of Boston worked through the bitter cold of two days and two nights, not daring to stop in case the ice became too thick again before the job was completed. On February 4, with an iron plate fixed to her bows, the *Britannia* heaved herself away from the wharf. Her paddles sent cascades of water and splinters of ice over the crowds who skated within a yard or so of the vessel. She made the open sea in just over an hour, the iron guard on her bows smashed to pieces but with no other damage to the ship. On her return journey from Liverpool she brought a message of thanks from the British Post Office and a request that it should be permitted to compensate the city of Boston for the cost of cutting that channel. The offer was refused.

The Cunard ships plied backwards and forwards with monotonous regularity. The sailing-ship interests, still pre-eminent on longer hauls, particularly for the emigrant business to the Australian goldfields, nevertheless found time to harry the usurper. Clipper masters would contrive to get in the way of the Cunarder as she belched smoke in preparation for her trip. There were minor collisions, fights at Liverpool over emigrants, and a cut-price war over cargo rates. Cushioned by the mail subsidy, Cunard blithely continued to expand his fleet. The most serious challenge came in 1850, when the United States considered the position where every letter to the Old World that was written was carried in a British ship. They did not approve of the picture at all.

While American patriots were vociferous in their criticism of the British monopoly of the transatlantic mail business, those owning American dollars were not so convinced that national pride was a business proposition. Congress offered a subsidy for American mails quite as good as that which Cunard was paid by the British Government, but there were no takers. A half-hearted attempt to raise capital brought in a measly $80,000 for an enterprise projected by a Mr. Mills who planned a New York-Southampton-Bremen run. It was a good idea, for apart from carrying the Easterly mails the ship on the return run would transport the mass of European emigrants bound for the New World. At the time about 15,000 people a year were passing through Bremen on the way to America. But the goal of their dreams had of necessity to be Liverpool. Only from the English port was cheap and regular sea transport available.

Mills gambled on success. He got sufficient money from the powerful Hanseatic interests to build a couple of ships, the *Washington* and *Hermann*. The Cunarder fares were undercut, the ships were bigger, and on paper they should have been faster. Despite a large amount of flag waving in both New York and Bremen the maiden voyage was hardly a matter for rejoicing. On the same day as the *Washington* left New York the Cunard's *Britannia*, then an old-fashioned veteran of the ferry, left on her usual Easterly trip. She reached Liverpool two days ahead of the *Washington's* arrival at Southampton.

But the advent of the Ocean Line, as the Mills enterprise was called, had one profound effect. The two vessels used New York as their American terminal, and Cunard, anxious not to miss any American business that was going, asked the British Post Office to permit him to alternate New York with

Boston. This was allowed, and so he provided a weekly service to America from Liverpool: one via Halifax to Boston and the other direct to New York. His competition was too much for Mills, and the project faded into oblivion.

Congress still criticized the executive for its lackadaisical policy over the country's shipping. The row coincided with considerable misgivings among the sailing-ship interests of America, who were realizing that, whatever advantages sail might have for global voyages, the direct run from coast to coast across the Atlantic was becoming a monopoly of steam.

The man who came forward to wrest the prize from Cunard was E. K. Collins. He deserved greater success than in the event he had, for he was a great sailor, a good business man, and a courageous owner. Born in Truro, Massachusetts, he served on West Indian merchant ships as a purser, eventually setting up his own line of full-rigged sailing ships plying between New York, Mexico, and the Caribbean Islands. In 1836 he launched the Dramatic Line, with a fleet of very fine packets named after Shakespeare, Garrick, Siddons and so on. Collins was given *carte blanche* by Congress to smash the Cunard monopoly in the Atlantic. An immense amount of hot air and polemics were bruited on the project. Collins was told by Congress that his virtues must include " talent, energy, faith of the highest order ". He must realize that " the demand was for speed, extraordinary speed ". This speed, indeed, might be used for more important things than showing a frothy wake to a Cunarder: " The steamers must be fit for the purpose of a cruiser with armaments to attack the enemy—if that enemy were Great Britain—in her most vital part, her commerce."

Whether these clarion calls were designed to spur the willing Mr. Collins to still more frenzied effort or whether the general idea was to prepare the American taxpayer for a hefty bill which, indeed, became far bigger than even he could have dreaded, is not clear. Congress passed the budget with acclamation and the Collins Line set about building some ships. They were very good ships indeed if economic considerations are ignored. The first of the four vessels which he bought was the *Atlantic,* a wooden ship built by William

H. Brown in New York and powered with two side-lever engines of 800 nominal horse power. She was a fine-looking ship, a Triton figurehead surrounded by mermaids at her prow. Inside her black hull with its band of dark red were many innovations for the comfort of the crew, which have always been notable in U.S. vessels. All cabins were steam-heated. Coal for the 32 furnaces was delivered to the stokeholds by mechanically driven buckets. The lifeboats were a novelty—they were made of galvanized iron.

The enthusiasm at the launching of the project was eclipsed on the start of the maiden voyage of the *Atlantic* from New York on April 27, 1850. She crossed to Liverpool in thirteen days. Cunard's best time was nine days.

More Collins ships appeared—the *Pacific*, *Baltic* and *Arctic*. They were faster than the best Cunarders and America jubilantly celebrated possession of the Blue Riband for passages in both directions. Cunard got ready for a long war. He ordered a new 3,000 tonner; moreover it was to be built of iron. She was the *Persia* and regained the Riband for Britain in 1856, crossing from Liverpool to New York at an average speed of 13·8 knots.

It was, however, a victory over a dying, almost vanquished adversary. Collins, who never lacked personal courage and had learned all there was to know about steamships by years of trial, had suffered blows of an unkindly Fate which would have caused a less doughty man to yield years before. In the autumn of 1854 the *Arctic* rammed at full speed a small French vessel during dense fog off Cape Race. Very slowly the water gained on the pumps, the stokers remaining at the furnaces until the water hissed on the bars. In a rising sea she foundered, and only forty-five people survived. Among the 325 dead were the wife and two children of E.K. Collins.

A little more than a year later the crack Collins liner *Pacific* dropped down the Mersey with 400 souls aboard. She was never seen again. In a magnificent gesture of defiance against the sea and the other ships on it he laid down the *Adriatic*, built for safety as well as speed, and the last of the wooden paddle steamers. She had engine trouble on her trials, and this demanded considerable alteration. When she arrived in the Mersey in December, 1857, the Collins Line was moribund. The U.S. Government withdrew its subsidy after pouring more than 1¼ million pounds into it. Before the *Adriatic* could sail again for England the Collins Line went into liquidation. But the ship lived on. She worked well under the Galway flag on the Galway-St. Johns run and ended her life as a West African coaster.

Cunard's success—now really an Atlantic monopoly—aroused the interest of other British carriers. William Inman, of the carrier firm of Pickfords, went into partnership with the firm of Richardson Brothers of Liverpool and founded the firm of the Liverpool, New York and Philadelphia Steamship Co. At first neither the ships they ran nor the route they took worried Cunard unduly, but the enterprise was very soundly managed and made good profits despite the lack of subsidy, and before long they challenged Cunard by running to New York instead of Philadelphia, though for fifteen years there was no real bid for the Blue Riband.

The opening shots in the new war against Cunard came with Inman's purchase of the *City of Glasgow*. She was a three-decked screw-driven vessel built of iron. For the first time the accent on the travel agent's publicity concerned the better class accommodation. While there was room for some 400 steerage passengers living in their usual discomfort, there was also a chemist's shop, "walls decorated with panelling showing views of places of interest", retiring rooms for ladies, and similar delights for the passenger able to pay for them. There was even a bathroom—one for the entire passenger complement. Despite the fact that the bath was filled with the "health giving salt water from the Atlantic by an apparatus for pumping" intending passengers ready to pay the 22 guineas for a first-class cabin berth were solemnly warned that immersion in this contraption was an enervating experience to be countered by an alcoholic stimulant. There were indeed business men behind the Inman Line. Alcoholic stimulants were extra. The 22 guineas included food and tips, but not wines and liquors.

Less spectacular for the advertising brochure leaflet but of more importance to the traveller was the fact that the *City of*

Glasgow was a good ship. She had been built in Glasgow as an experiment, being fitted with two engines geared to a single screw shaft. She had crossed the Atlantic several times, aided by sail, and had given a very good account of herself.

Inevitably the Inman Line found it necessary to augment business by enticing the emigrants into the steerage accommodation. By the time the *City of Glasgow* was on the Atlantic run conditions had improved—very slightly. Four years earlier the misery of the emigrants had at last aroused the public conscience, and the British Government ordered that food must be provided. Previously the only thing the emigrant was given was water—and that in minute quantities. He had to bring his own food, and whether through poverty, ignorance of the time the journey would take, or because of the more usual purgatory of a few more days than had been anticipated on the voyage, disaster had always struck a percentage of the travellers. Human nature was not seen at its best in the glorified box where the emigrants lived. There may have been kindly gestures of help, but more often there was brutal victory to the strong. The weakest became ill, and illness in such conditions usually meant death. Under the new laws each emigrant had to be provided with a weekly ration of 5 lb. of oatmeal, 12 lb. of wheaten flour, 2½ lb. of biscuits, 2 lb. of rice, and 2 lb. of molasses. To wash down this dietically most unsuitable provender the emigrant had to be allowed 6 pints of water a day. For those who liked to perform some simple ablutions as well it was probably insufficient. This diet, immeasurably better as it was for the emigrant, still compared unfavourably with the food of the crew. They had fresh meat twice a week, and they had almost unlimited quantities of pickles with which to stimulate the saliva for digesting the mounds of starch on which they lived. They were hard times on the Atlantic, those days when a new nation was welcoming men, women and children who were not afraid of a hard life. The sea crossing was their baptism of endurance.

The Inman fleet soon included the *City of Manchester* and the *City of Philadelphia*. By 1856 the American terminal was New York and Cunard again had a competitor. Its reply was the *Scotia*, a magnificent ship, the last of the Cunard paddle steamers. She was launched in 1861 and made a record crossing from New York in 1863. Her 14 knots average speed was not challenged till 1867 when Inman's best vessel, *City of Paris*, cut the time by 33 minutes on the Westbound run, but failed to beat the *Scotia's* Easterly record. Her life was long and useful. She served as a trooper in the Zulu War of 1879 and was eventually lost at sea through collision in 1885 while carrying coal from Cardiff to Marseilles.

Other *City* ships followed under the Inman flag, and they built up a great reputation for comfort as well as speed. Inman personally owned this flourishing business until 1875, when it was changed into a private limited company. His premature death at the age of fifty-six in 1881 deprived the organization of one of the acutest business minds which has ever dabbled in the tricky trade of transatlantic shipping. More capital was urgently needed, but could not be found in Britain; so America stepped in, with the purchase of the goodwill and the ships in 1888. The Line lost all its British connections in 1893 when it was re-named the American Line and the ships flew under the United States flag. With that change the famous *City* prefix disappeared, and the vessels were known simply by the names of capitals.

One of the vessels taken over was the crack liner of her day —the *City of Paris*, second holder of an illustrious name. She was the first ship to cross the Atlantic in under six days, which meant an average of twenty knots. Her Glasgow builders put all the famed Clydeside strength into her. Like her sister, *City of New York*, she was built of steel. Cursed with bad luck, she weathered misfortune time after time. She was driven very hard indeed, and in a March gale in 1890 a disaster which is always in the bad dreams of marine engineers occurred. The propeller shaft fractured while the vessel was running at full speed. In a moment of time the whirling rods smashed away the connecting rod bolts and pulverized the low pressure cylinder. The metal flying around tore the starboard engine to pieces. Luckily none of the engine room hands was near at the time and no one was killed. More than that, the devastation was so severe that the centre-line bulkhead was damaged. The result was that as water flowed into the wrecked starboard engine room it could pass into the port engine room where the pumps could deal with it. The ship continued to float on an even keel, was able to keep pace with the flood water and was towed safely into Cobh. There, after the hull damage had been patched up, she proceeded under her own steam to Liverpool. Nine years later she ran aground on the Manacles Rocks near Falmouth, and once again escaped fatal damage. After considerable alterations she was re-named *Philadelphia*. In 1920, a grand of old lady of the Atlantic, she tried her strength with a whale and came off best. Shortly afterwards she was sold to Italian shipowners for the Mediterranean trade.

In the twenty years in which the Inman Line in one form or another gained fame on the Atlantic run there were others which ousted Cunard from their accustomed eminence. The best-known was the White Star Company, the origins of which went back to the Australian gold rush days when they ran a clipper service to the Antipodes. White Star were still running sailing ships in 1866 when a young man named Thomas Ismay, who had served his time on sailing ships and learned the financal end of the business in Liverpool shipbroking firms, bought up the assets of White Star and founded the Oceanic Steam Navigation Company. Ismay's first ship was built by two of the shareholders in his new company, Edward Harland and Gustav Wolff, shipbuilders of Belfast. The vessel was the *Oceanic*. It was comfortable, reliable, but no world-beater. The prophets who forecast great things from the new company had to wait until 1874 when Harland and Wolff launched the *Britannic*. She held the Blue Riband from 1876 to 1879, losing it to the *Arizona*.

This ship was the apple of the eye of yet another company running ships on the ferry: the Guion Line. The inspirational brain behind this company was an American, Stephen Guion. He went to Liverpool to handle the emigrant business for his employers, the Black Star Line, owners of some very good clipper ships. Cunard tempted him into their employment and after more than thirty years in the Liverpool shipping business he felt that he could justifiably launch out on his own. Seldom has any shipping company had so many failures and carried on. It had a good name in the emigrant trade, and while this bread-and-butter business kept the wolf from the door Guion was determined to attain the prestige of a Riband holder. He was ill-served on the technical side, and his plea for something different merely resulted in his getting something untried. Two ships, the *Montana* and *Dakota*, were ordered. Their hulls looked peculiar but it was as nothing to the strangeness of their engines. Water-tube boilers were used, and every device adopted to extract the last ounce of energy from the steam. Some parts went straight from the drawing bench into production. The result was perhaps inevitable. On the *Montana's* trial trip from Tyneside to Liverpool tube after tube blew out, and before she had entered the English Channel five out of her ten boilers were useless. Patched up at Portsmouth, she was refused a certificate by the Board of Trade until she had undergone a week's trial. Once again the tubes blew, and the boilers had to be removed. Her sister, the *Dakota*, was not quite such a fiasco, though on the same trial journey the low pressure cylinders failed and the overworked high pressure cylinders burst their pipes. Altered and patched up, the *Dakota* went into service, lumbering across the Atlantic in ten days against her rival's seven and a half, and now and then running out of coal in mid-ocean. Both ships decently wrecked themselves on the Welsh coast and became just a bad memory.

All this sort of thing did not deter Guion. By 1879 he had the Glasgow-built *Arizona* at sea. The notoriety of the earlier Guion ships meant that the *Arizona* had an enormous amount of free publicity—of doubtful value. The press in America had their witty reports almost written and ready for telegraphing ten days or so after the ship dipped over the horizon from Liverpool. She made New York in under eight days, the fastest maiden voyage up to that time. Soon afterwards she took the Riband with an Eastward run of just under 16 knots average, and became easily the most popular vessel with both wealthy passengers and emigrants. Even when she rammed an iceberg at full speed and crushed her bow to a depth of

26 ft. and 14 ft. below her water line, she was basically unharmed. Her owners had a wooden bow fixed on at Newfoundland and she then fulfilled her scheduled return trip at normal speed. Some years later she was sold and went on the Pacific trade. In the first World War she returned for a time to the scene of her triumphs, making an average of 13 knots with a battalion of U.S. marines bound for France in 1918 under the name of *U.S.S. Hancock*. Forty-five years after she was launched, in 1926, she died under the breaker's hammers in a San Francisco yard.

Even while the *Arizona* was the star of the Atlantic ferry there was considerable gloom in the Guion Line offices. Money was short, but the company contrived to find the finance for two new vessels, the *Alaska* and *Oregon*. The *Alaska* found ephemeral fame by bringing the Easterly trip down to under seven days, and the *Oregon* won the Riband in the winter of 1883-4. A few weeks later she hoisted the Cunard house flag. The Guion Line was no more.

Cunard bestirred itself in the 1880's to regain the Riband with two single-screw steamers, the *Umbria* and *Etruria*. The latter cost about £400,000, easily a record for the time. By 1888 she had earned the record for both directions.

As the nineteenth century drew to a close there were increasing signs that Germany was determined to find a place in the Atlantic trade. The development was at least in part due to rivalry between the German shipping lines, but behind it all was the new nationalism of the German Empire. Whether conferences at Potsdam had even then resulted in a rough schedule of the programme to prepare for 1914 is a matter for argument. Probably the Kaiser's orders to his ministers to see that the German eagle flew as fast across the Atlantic as any other country's emblem was a matter of prestige quite as much as war preparation.

Britain politely built Germany one or two extremely good vessels and obediently included strengthened decks as ordered by the German Admiralty, but this arrangement could hardly be a matter of complete satisfaction for the master race, who were in any event very good shipbuilders themselves.

Norddeutscher Lloyd was the commercial organization chosen as the industrial nominee for the German Admiralty's plans. The company asked for tenders for construction of two super-ships. It demanded record-beaters, with the right to reject the vessels without question if on the first return voyage to America they failed to come up to the standards required. Vulcan of Stettin and Schichau of Elbing meekly accepted what was obviously an official order. Vulcan's *Kaiser Wilhelm der Grosse* sailed on her maiden voyage in September, 1897. She averaged 21·39 knots Westwards and 21·94 knots home. Teutonic pride was justified in this magnificent performance, and the two-way record was Germany's in a voyage soon afterwards. By contrast the other builders, Schichau, failed miserably with the *Kaiser Frederich.* She could not better the 1876 figure for the outward run and the 1852 figure for the return voyage. Like a defective toy with a money-back guarantee, the ship was returned to the builders. They could not sell her elsewhere for 15 years, when France bought her at a bargain price. The Germans torpedoed her soon after war broke out.

The end of her more successful sister was just as ignominious, though her life was distinguished. At one time the German Riband holder was carrying 25 per cent of all passenger traffic on the ferry, and Britain had good reason to be alarmed at her supremacy. On the outbreak of war she became more directly dangerous. On the night of August 3-4, 1914, she slipped into the North Sea, her famous yellow funnels and creamy upperworks painted jet black. She managed to reach the Atlantic, but as a commerce raider she was not particularly successful because of her voracious appetite for fuel —250 tons a day under normal steaming. After three weeks she found the Western Approaches too hot for comfort, and the Royal Navy sent her running for cover on the West African coast. She hove to off the coast of Rio de Oro, despite protests from the Spanish Governor, and awaited her colliers. They arrived at the same time as *H.M.S. Highflyer* which sent her to the bottom, a sitting target for her eleven 6-inch guns.

Though the early years of the century were times of German supremacy the British pre-eminence was due for certain return. In the same month that the *Kaiser Wilhelm* steamed arrogantly down the English Channel an exciting event had occurred in the Solent. Between the lines of the British Navy drawn up in review on the occasion of the Diamond Jubilee celebrations a small black boat throbbed into the sacred thoroughfare of open water down which Victoria was to sail in review of the mightiest fleet the world had ever seen. Fussy picket boats moved out to stop the intruder. The boat pulled away easily. The fastest torpedo boats on parade hurriedly moved to full speed. The little black boat simply dug her stern in the water, put up her speed to 40 knots, slowed down to make a few derisive circuits of the naval pursuers and then sped away. Sir Charles Parsons had demonstrated to a conservative Admiralty the value of the turbine engine.

First turbine ships down the launching ramps were the *Victorian* and *Virginian*, built at Glasgow and Belfast for the Allan Line which ran ships between Liverpool and Halifax, and were not therefore contenders for the Riband. The *Victorian* was actually the first to be ready for service, but her sister proved the more notable boat. On her trials in 1905 she attained a speed of 19·8 knots, far lower than the record, of course, but a fine performance for engines of 12,000 shaft horse power.

Not until 1909 did a turbine ship challenge the older type for the Riband. This was the *Mauretania,* built on the Tyne, and the proudest ship that has ever cleaved the waters of the Atlantic. She was equipped with Parsons' turbines of 70,000 shaft horse power. Many thousands of people, like the writer, cannot read that name without nostalgia for her supreme comfort, the fascination of exploring this floating hotel of nine floors, and the perfect service from everyone who served on her, who seemed imbued with the feeling that it was a privilege to be on board.

Whatever the future holds, it is unlikely that there will ever be a ship on the Atlantic with such a long and glorious life. The *Mauretania* took to herself the prestige that would have been partially the possession of her sister the *Lusitania,* if she had lived. She spanned not only two worlds but two ages. When she first took the record from the *Kaiser Wilhelm II* Edward the Peacemaker was on the throne of England, and a brave new century was being launched by a prospering world full of hope and faith in the future. In 1914-18 she loomed up in the grey oceans as a mighty guardian of the food convoys, her guise as an armed cruiser making her appear a very formidable First Lady of the Seas indeed; later she saved the lives of thousands of men in the white paint and red crosses of a hospital ship, and when the war to end wars had been won she refurbished herself, thrashed the water with her screws on the route she knew so well and for twenty-two years dared anybody to take that Blue Riband which in spirit hung above her four smokestacks. When she left New York for the last time on September 26, 1934, a sober New York, sunk in the gloom of depression, did its best to bestir itself into its traditional gaiety. It was no good. The sirens of the ships in the docks could blow only mournfully in the autumn air; the thousands of people, dockers, Customs men, and ordinary folk from the tenements of East Side, could merely stand and watch as the *Mauretania* slipped away towards Sandy Hook and Home. But it is good to know that through her aerials that day came a message from England: "The *Queen Mary* has just been launched on the Clyde". The Queen of the Atlantic was dying. Long live the Queen. It is almost too banal to write for the record that the *Mauretania* was broken up at Rosyth in 1935.

Before the *Mauretania* left the ferry she had almost yielded the Riband. The strained economies of Germany and Italy had been stretched to build a number of crack liners. The *Bremen*, which carried an aircraft catapult to speed up the mail service, was a fine piece of shipbuilding for Norddeutscher Lloyd. On her maiden voyage in 1929 she captured the Riband from the *Mauretania* after twenty-two years, with an average speed of 27·8 knots. Four years later Italy's *Rex* pushed up the speed to 28·92 knots. Both these liners were destroyed by allied action during the war.

All this time the *Queen Mary* had been on the stocks on Clydeside. The depression resulted in work being abandoned for some years, and the result was that Britain's certain recapture of the trophy at an unknown future date gave France the opportunity for her first slice of glory.

France is not a maritime nation, but she has made some notable contributions to the Atlantic ferry. She rarely troubles to point out that it was a French steamer, *Caroline*, which crossed the Atlantic in December 24, 1824, eleven years before the historic crossing by the *Sirius* and *Great Western*. She was built at Rouen, and was the first steam auxiliary vessel in the French Navy. Her Atlantic crossing was from Brest to Cayenne, and as head winds reduced her speed to 2 knots the time of her arrival was not recorded by a sensitive government. More than a century later France entered the fray with the first of the thousand-foot vessels, the *Normandie*. She was probably the most luxurious ship ever to ply on a route where luxury is accepted as the rule. She was also a magnificent engineering job, and most seamen were glad that she won her due with the Riband record of 31·2 knots for the Eastward run in 1937, though she lost it to the *Queen Mary* within the year. She had two short years of service after this, but on the outbreak of war was docked in New York for safety. Fire broke out in 1942 during her conversion into a troopship, and this lovely vessel ended her brief life in the breaking-up yards of Port Newark.

The *Normandie* won the Riband before the *Queen Mary* had time to show her paces. In the good and ready time of the Cunard company the *Queen Mary* let loose her 160,000 shaft horse power, and in 1938 she made the crossing at a speed of 31·7 knots. Her younger sister, the *Queen Elizabeth*, launched a few months afterwards, is a more powerful ship (181,700 shaft h.p.) and there can be no doubt that she could quite easily beat her sister's record. There is a universal belief among waterside men at Southampton that, while the *Queen Mary* floats her sister will never snatch the honour for the Cunard-White Star flag.

The stately *Queens* had things all their own way in the immediate post-war years. There were optimists I met in the Southampton docks who believed that the younger *Queen Elizabeth* had reserves in her engine room which would keep the Riband in British hands despite the stories of a super-liner on the stocks at Newport News, Virginia. Marine engineers knew better. They realized that the day of the mammoth liner was passing, that fourteen years of research and construction under the pressure of war had made still faster crossings easy—if speed was the only criterion. When the *United States*, the biggest passenger ship ever built in the New World, nosed out into the Atlantic for the first time in June, 1952, its 165,000 h.p. pushed the ship's speed up to 34 knots, and managed 20 knots in reverse, just to show what could be done. Not without reason the crew came back to port with a broom at her masthead. This brash boasting was not mere vanity. On her maiden voyage that summer she easily took the record in both directions. The honour was in American hands for the first time in a century. In 1851 the Collins' vessel *Baltic* averaged 13·17 knots from Liverpool to New York, and it took four years to wrest the record back. This time it looks as if the *United States* will hold the Riband for much longer. At the time of writing Cunard have two Atlantic liners on order, both for the Canadian service and not in the record-breaking class, if that must be the term for the modern racing steamship.

Unless British ships are subsidized, and that is something which by tradition the companies dislike, the very fast mammoth liner is no longer a proposition for shareholders who are in the business for profit as well as prestige. Speeds above 30 knots mean far less space for passengers and heavy operating costs after the vast expenditure on construction.

In the golden age of transatlantic transportation the passenger trade was nicely balanced between large numbers of emigrants and people to whom money was no object. The designers could let themselves go in producing floating cities where ostentatious luxury skimmed the cream of the revenue while the rest of the accommodation was eagerly taken up by more economically minded persons who, rather disappointed with living conditions, put up with them because of the advantages of speed. To-day the transatlantic air services run luxury planes for the wealthy and are rapidly overcoming the problem of reducing their rates for middle-class tourists to a figure comparable with those of the steamship companies when the time factor is also taken into consideration. This trend will continue. Aircraft design is rapidly improving the pay load and fares will drop steadily. It is unlikely that the shipping companies can afford to do much in this way to compete.

The ideal ship for the Atlantic ferry would carry a total of 2,500 passengers in two classes, both of a good standard of comfort, with neither the one ultra-luxurious nor the other unduly Spartan. She would need a cruising speed of 30 knots, not only for the convenience of the passengers, but also to achieve the maximum number of return trips during the year.

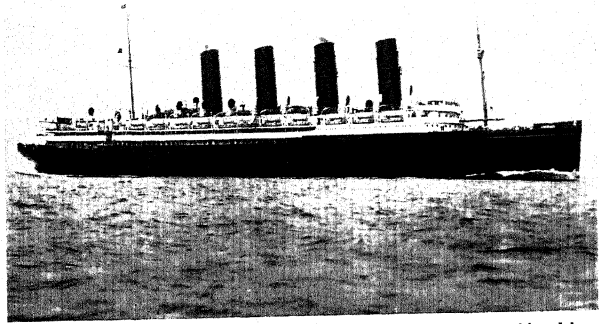
Though the *United States* can travel at 40 knots, in her first year of service she averaged around 30 knots for the sake of fuel economy. This speed enabled her to make 23 round trips, or 46 passages: a very good record indeed, particularly as she attained about 94 per cent of passenger capacity as compared with 80 per cent of the *Queens.*

Statistics of this kind indicate how the accountant has steadily moved into the seats of the mighty so far as the transatlantic passenger vessel is concerned. Company promoters could always buy good engines (usually from Clydeside) and they could quite easily hire good masters. The dangers of financial disaster were far greater than those from storm, iceberg, or mechanical failure. Collins, as fine a man as any who accepted the challenge of the Atlantic ferry, never admitted defeat when tragic disasters took his ships and his family. But the pressure of finance made him yield in the end.

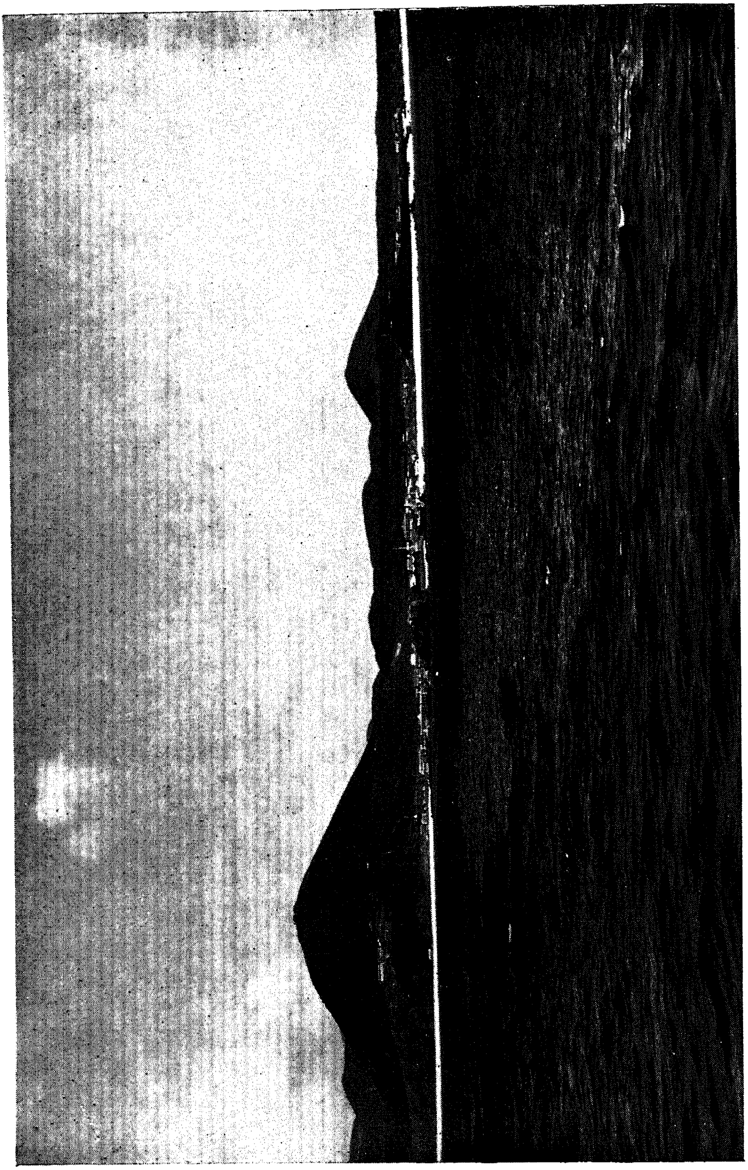
This time the American taxpayer has few illusions about the amount of money he will have to find. Before the *United States* sailed on her maiden voyage he knew that he had met nearly two-thirds of the construction bill with 42 million dollars of Government money. He knew that the ship was primarily a troop carrier with little chance of paying her way, without a subsidy, as a passenger vessel.

This is not intended to belittle the triumph of the *United States.* She is a fine ship—fourteen years of progress better

28. Contender in the new battle of the Atlantic for the passenger trade: a B.O.A.C. Stratocruiser above the clouds of the grey Atlantic



29. The best-loved ship which ever sailed the Atlantic: the turbine-driven *Mauretania*, holder of the Blue Riband for twenty-two years. Her sister ship was the *Lusitania*, torpedoed in 1915



30. Ascension Island. Georgetown—a view from the sea

than her greatest Cunard rival. She is a worthy holder of the Blue Riband, held on more than a hundred occasions since 1840 by Cunard. It is not too much to hope that one day a new, albeit smaller, ship than the most recent holder will slip past Bishop Rock and lay her white wake behind her British hull through the grey ocean faster than her American rivals. I know Cunard employees who consider it heresy to doubt the probability of this. Always, without fuss or hurry, the challenge has been met. Yet the supreme record of the Cunard ships on the North Atlantic as regards speed is purely incidental. The Line has never accepted any trophy for the fastest crossing. Regularity of service in all weathers combined with safety and comfort for the passengers has been the maxim.

In 1952, when the *United States* entered the ferry service, the Chairman of Cunard stressed that these aims have not altered. "Speed for the sake of speed has not entered our reckoning," he said. "Our sea knots, as the captains of our ships well know, are at the service of our schedules and not for the sake of speed, except perhaps for emergency or on the dark occasions during the war."

When the *United States* passed the *Queen Elizabeth* in mid-ocean during the summer of 1953 the American signalled politely "Sorry, old girl". The answer, which was promptly given, "Old ladies of reputation do not wish to be in fast company", was not a retort of wry defiance but a sentence expressing the solid reliability of British tradition in these matters. Nevertheless, that tradition should one day produce another ocean greyhound which, in pursuing the ideals of safety and reliability, will also achieve a record crossing. It has happened a hundred times before. It will happen again, if the resources of our shipyards and the seamanship of our sailors have their way.

CHAPTER XI

ABOVE AND OVER

THE first optimistic essay into the Atlantic skies began on October 15, 1910, when a small airship, the *America*, driven by two 80 h.p. engines, rose uneasily from a mooring ground at Atlantic City, watched by an admiring crowd.

Walter Wellman, an airship pioneer, had a crew of five. He wisely took a well-provisioned lifeboat with him. The strangest idea was a battery of cylinders which floated on the sea and were supposed to keep the blimp steady on a 300-ft. hawser between the cylinders and the crew housing. This device, which was called an equilibrator, worked reasonably well in calm water though, of course, its drag effect was severe. But once the cylinders were bobbing about on the open sea they threatened to shake the airship to pieces. Overnight Wellman flew along the coast for some 275 miles as far as Nantucket Island. His proposed route was via Newfoundland and the Azores, and later knowledge suggests that the *America* could not even have drifted across. Actually the crew were compelled to abandon ship, and their lifeboat was picked up by a steamship called the *Trent*, with no harm done beyond the loss of a good little airship which, released of its lifeboat and the cylinders, rose skywards and disappeared.

This bizarre effort did have the effect of stimulating interest in Atlantic flight. In America the store king, John Wanamaker, offered to finance the construction of a heavier-than-air machine to attempt the crossing. In Britain the *Daily Mail* announced a £10,000 prize for the first across. The Americans were well ahead with a tri-motor seaplane designed by Glenn Curtiss, which was to have been flown by a British aviator, Commander John Porte, of the Royal Navy. The outbreak of war resulted in his recall. Porte, incidentally, was killed in a British five-motored seaplane during a test flight at Felixstowe. This machine was built with an eye to an attempt on the Atlantic crossing.

On the entry of the Americans into the First World War, remarkably fine flying boats were designed for war operations. It was intended to fly these naval Curtiss machines into the European war theatre, instead of shipping them in pieces, as a morale boost for the allies and the intimidation of the enemy. A specal department, the Bureau of Aeronautics' Transatlantic Division, was formed to plan the flight. Though the Armistice came before plans or machines were ready, the work went on and in the first few weeks of 1919 preparations reached a final stage.

Rivalry between Britain and the United States was great. Though there was the stimulus for British pilots of the £10,000 prize the real goal was to beat the Americans. It would mystify the modern aircraft designer to know that one machine was designed and built in less than two months by Sopwith. It was a biplane fitted with a single engine and fuel tanks for a flight of 31 hours. More promising was the civil version of the Vickers *Vimy* bomber, powered by two Rolls Royce engines and capable of cruising at 90 m.p.h. for twenty-seven hours. Boulton and Paul built a civil version of their *Bourges* bomber. It was, for those days, a powerful machine with two 450 h.p. engines, and capable of a range of 3,800 miles. A certain amount of streamlining gave it a speed of 116 m.p.h. It was designed to fly part of the way on one engine, thus increasing the range still further. If an engine had not unfortunately cut out during a take-off on test, causing damage which could not be repaired in time, this machine would probably have won the race easily.

There were other machines being prepared for the race, but either through accident or inability to complete construction in time the actual contest resolved itself into two British machines versus three American flying boats. While the British were aiming at a non-stop crossing on the Great Circle route between Newfoundland and Ireland the Americans prepared for a flight which was really a strategic experiment.

The U.S. Navy flying boats, known as NC1, NC3, and NC4 were large machines, even by modern standards. Powered by four Liberty engines aggregating 1,600 h.p., their wing span was 126 feet. The weight, fully loaded and with a crew of six, was 14 tons. On short flights they were perfectly capable of carrying 50 passengers. With a maximum range of 1,500 miles they had to choose the Newfoundland-Azores route. This was the major risk element in the American plan, for locating a few dots of land in mid-Atlantic demanded almost impossible feats of navigation in days when wireless was unreliable and radio aids non-existent. The U.S. Navy covered this contingency by stringing fifty naval vessels along the route and fixing up an elaborate code of wireless and light signals. These precautions were, in the event, still really insufficient.

The three flying boats took off from the water off Long Island on May 8, 1919, en route for Trepassey Harbour, Newfoundland, nearly 1,000 miles to the North-East. In the flagship of the little fleet, with Lieut.-Commander J. H. Towers in command, was a young officer named Lieut.-Commander R. Byrd, whose later flights over the polar regions as well as the Atlantic have put his name among the great air pioneers of the world's oceans.

The weather deteriorated rapidly, and the NC4 had engine trouble. It landed far out to sea off Massachusetts, and taxied for more than 100 miles to land and safety. Though it was a depressing start there was a vivid evidence of the seaworthiness of the Curtiss design which was later to be even more amply proved.

The other two machines reached Halifax after nine hours of very bumpy flying, and underwent some minor repairs. Next day they reached Trepassey Harbour. The NC4, none the worse for its sea voyage, arrived later. On the evening of May 16 they were off. Weather was bad and clouds low, but from time to time they glimpsed the searchlights of the warships strung along the route. At dawn the NC1 and NC3 could see nothing of the NC4; it had, in fact, flown far ahead.

The NC3 was running out of petrol and its captain, calculating that he was very near the island of Flores, decided to land on the water, take more accurate bearings, and fly off again. Though there was little wind and the crew could see no white horses Lieut.-Commander Towers had not taken into account the ocean swell. He bounced off one wave and fell into a trough, being immediately washed by the next wave. The impact split the hull. It was fortunate that the crew were navy men. There was no panic, and the seaplane was immediately handled like a boat in trouble. Sea anchors made from buckets kept the machine heading into the wind. The motors were all right, and the captain began taxi-ing towards the estimated position of the Azores. The wireless operator was able to receive messages from the navy ships which indicated that little help could be expected from that quarter: they were searching well to the West. It was early afternoon when they landed on the sea. Forty hours and two hundred miles were to pass before they sighted land. In that time the crew added another story to the Atlantic saga. Without skill, discipline and courage death would have been inevitable. Storms with winds up to 60 miles an hour threw the machine about like a cork. When a wing pontoon was torn away men strapped themselves in relays on the other wing to balance the flying boat. The food was spoiled by sea water in the first hour. Baling had to continue without cessation. The engines had, of course, been stopped after the first afternoon's attempt at cruising, and much of the lubricating oil used in an effort to smooth down the breakers during the storms.

When, with a rainy dawn, on Monday, May 19, they saw the hazy outline of San Miguel in the Azores they were simultaneously seen by the U.S. destroyer *Harding*. Lieut.-Commander Towers refused assistance. With the engines that would still function and his crew either lying on the wings or baling in the fuselage he limped into the tiny harbour—a glorious failure. The welcome he received probably eclipsed anything he would have experienced if he had simply glided from the sky in perfect trim.

The NC1 was also forced down. Heavy fog in the vicinity of the Azores made it essential to land on the sea so as to avoid the risk of a head-on crash into the mountains. This machine was also severely damaged by the swell, though it remained afloat until a passing merchant ship rescued the crew.

The third flying boat, the NC4, was more lucky. In the middle of the morning the weather cleared briefly and the navigator saw a destroyer below and an island a short distance ahead. As fog closed in again the pilot climbed to avoid the risk of crashing into the mountains and kept on for another two hours. The NC4 made a perfect landing in the harbour at Flores, 15 hours 18 minutes after taking off from Trepassey Harbour. By that evening the weather had deteriorated. The NC4's captain, Lieut.-Commander Read, was not able to resume his flight until May 24. He then reached Lisbon just under ten hours later and thus achieved the first aircraft flight across the Atlantic. The actual distance covered was 2,400 miles in flying time of 25 hours 1 minute. On May 31 the seaplane tied up in Plymouth Sound, within sight of the steps down which the Pilgrim Fathers had walked for their embarkation in the *Mayflower* nearly three centuries earlier.

This careful and costly expedition, which had fortunately resulted in no loss of life despite accidents and appalling weather conditions, was almost ignored by the public because of the more spectacular race which took place simultaneously. On the morning that the three American flying boats took off British entrants for the £10,000 contest were almost ready to start on a non-stop attempt.

Harry Hawker arrived in Newfoundland in March with his *Atlantic.* The navigator for his little Sopwith biplane was Commander Mackenzie Grieve of the Royal Navy. The take-off area they chose was, of course, still snow-covered at that time, and was so uneven that a start before the ground could be levelled was impossible. Even then the maximum take-off run they could hope for was 400 yards. Shortly afterwards F. P. Raynham and Captain W. Morgan turned up with their *Raymor* biplane. The contestants soon found that the spring thaw brought fresh troubles: the ground became a morass. Even when they watched the American seaplanes fly past on the first leg of their voyage they were not too dispirited. By selecting the Great Circle route for a non-stop flight they could still easily reach Europe first. When news came through that the NC4 had reached the Azores Hawker determined to start, though conditions were ominous.

He took off at 3.30 p.m. on May 18, jettisoning his undercarriage as soon as he had cleared the coast. At 11 p.m. he noticed the first signs of engine trouble. Through radiator leaks the motor was overheating even in the icy conditions they were experiencing. Hawker had continually to climb to 12,000 feet and then shut off the engine to allow it to cool, restarting only when he was almost on the water—on one occasion he failed to restart until he was a mere ten feet above a very angry sea. The end came after fourteen hours' flying when Hawker had covered about 1,400 miles. He sighted a small Danish tramp, the *Mary*, and after signalling her with Very lights, he put the robust little *Atlantic* down on the sea. Though the *Mary* was not able to salvage the machine another ship found it some days later, and the mail Hawker had been carrying was in due course landed at Falmouth.

The *Mary* had no wireless. While she plodded on to the Scottish coast the first big air-sea rescue organization in the Atlantic began. Destroyers and aircraft swept the sea of the Western Approaches, as it was estimated that Hawker had probably come down in that area (actually through a navigational error he was well to the North of his intended route and of the main shipping lane). While the search was operating the *Mary* signalled the coastguard station on the Butt of Lewis that she had both Hawker and Grieve safe on board. It was the big news story of the year, for after nearly a week without news there were very few who believed that they could still be alive. Their journey Southward, after a destroyer had taken them off the *Mary*, could not have been more of a triumph if they had made a perfect landing. Later the battered little machine was exhibited on the roof of an Oxford Street store. The writer recalls seeing it there after shuffling with thousands two hours and experiencing a keen sense of disappointment. It was absurdly tiny and frail-looking. Without the life of its engine and the spirit of the men who had looked on it as a reasonable risk for a journey of 2,000 miles the *Atlantic* was pathetically unimpressive.

While Hawker and Grieve were lost to the world in the *Mary*, Raynham suffered disaster. His aircraft crashed on take-off and both he and his companion were injured. Britain had one more reserve: Alcock and Brown's Vickers *Vimy*. Preparation for this flight was much more thoughtful and thorough, and both men were well fitted for the enterprise. John Alcock had raced in many earlier flights, and in the war had been a flying instructor with the R.N.A.S., and afterwards a bomber pilot in the Middle East. Whitten Brown was was that rare and valuable personality—a trained navigator. Pilots there were in plenty; navigators were (and are) in short supply. Both the American seaplane and Hawker flights had shown up navigational errors and defects, and subsequent flights indicated that few flyers could hope to do more than hit Europe somewhere. Selection of a landfall like an island or headland was far too ambitious. Brown, a Scottish-born son of American parents, regarded aviation, not as an exciting stunt, but a practical aid to surveying, his great interest.

The *Vimy* took off on June 14 with a goodish tail wind until it reached the inevitable fog banks to the North East. After nightfall Brown was able to make only occasional observations because of cloud and fog. Apart from one frightful period when cloud destroyed all visibility and the machine emerged just in time for Alcock to realize he was practically upside down and diving within a thousand feet of the sea, the voyage caused no serious qualms. At 6.40 a.m. on June 15 they sighted the islets off Galway and ten minutes later the masts of Clifden wireless station loomed out of the mist. For nearly two hours they circled the area, hoping to gain attention from the wireless station or the people of Clifden with signals indicating a suitable place to land. No one took any notice of them, and finally Alcock chose a smooth-looking field and put the *Vimy* into a glide. As soon as the wheels touched the ground they dug in and tilted the machine on its nose. The field was actually an Irish bog. Though the flight had the semblance of ending in disaster this was not the case. Apart from minor defects like wireless failure the *Vimy* was fit and fuelled for a further 1,000 miles flying. She had been airborne for 16 hours 28 minutes and averaged 110 miles per hour on the coast-to-coast flight of 1,890 miles. The flyers' reward was international fame, a knighthood each and, of course, the *Daily Mail* £10,000.

The summer of 1919 also saw the successful flight of the R.A.F. airship R34, an expedition organized with all the care of the U.S. seaplane flight. With a crew of thirty the R34 rose from East Fortune, near Edinburgh, at 2 a.m. on July 2. She crossed to the Clyde estuary and after sighting Rathlin Island, off County Antrim, headed out to sea. The route was on the Great Circle, with a slight deviation to keep near the shipping lanes. The R34 made landfall at Trinity Bay, Newfoundland, fifty-nine hours after passing the Irish coast. The aim was to make New York. Eventually it landed at Mineola, New York State, after some 108¼ hours in the air. Incidentally, when the R34 passed over Boston the airship dropped one of her officers—Major J.E. Pritchard, the first parachutist from the Old World and the first man to reach America from Europe by air. The return trip took 75 hours.

Though of military and technical value, the R34's voyage was no forerunner of commercial airship flights. The cost was enormous and both trips were a nightmare of storm evasion. Nor was the time so remarkably better than a crack liner's. More than five years passed before any further exploit of aviation conquered the Atlantic. Then, in October, 1924, a small German Zeppelin, the ZR3, due for delivery to the U.S.A. under war reparations, flew from Lake Constance via France, Spain, the Azores, Bermuda, Nova Scotia, and Boston, to New York. Her somewhat sinuous track was due to the usual bugbear of the airship navigator: storms. The ZR3 actually covered 5,000 miles non-stop in 80¾ hours and paved the way for the Zeppelin passenger service which began in 1928 but suffered a mortal blow after the *Hindenburg* disaster when this airship, probably the best and last of such vessels, burst into flames while landing at New York.

The R100 which took the British ensign in both directions in 1930 marked another successful voyage which aroused the enthusiasm of the partisans of lighter-than-air craft. The destruction of her sister ship R101, on the inaugural Britain-India flight not only killed half the brains of British airship construction; it also signed the death warrant of public confidence in airships' possibilities.

The Lindbergh flight provided the psychological stimulus destined to re-direct public opinion. His and the other flights did little to help technically, for duration flights, engine tests under bad weather conditions, and so on, were all being quite adequately advanced by less spectacular methods in the research departments of manufacturers and by the air forces of every nation in the world.

Lindbergh, named the Flying Fool by press reporters seeking an alliterative headline rather than truth, was by no means the stunting idiot the name implied or his imitators often were. Apart from the fact that he chose to fly alone, regarding petrol as a more valuable cargo than a human being, he assessed his chances with meticulous care. He was, for one thing, a born navigator. When he entered the U.S. Army Air Service he was one of eighteen in his class of 104 who obtained their wings. He had already given joy rides for years. After a year with the army he became a mail pilot for the Chicago-St. Louis run, nearly always flying at night. In these operations he learned by bitter experience the defects of maps and manuals. He acquired the ability to navigate by instinct, but he trusted that instinct only so far that his target area on the European side extended from Spain to Norway and he would still have enough fuel to reach the bullseye at Paris. He dismissed utterly any idea of pin-pointing an island in the Azores or even a blob on the ocean like Ireland.

Business men in St. Louis found about £5,000 to finance his flight. Lindbergh added his own savings of £500. The certain reward for success was the £5,000 prize offered by Mr. Raymond Orteig for the first New York-Paris flight. He then had to buy an aircraft. The Fokker Company refused to co-operate, fearing the damage to their reputation if a single-engined machine failed. Eventually a small concern named Ryan Airlines agreed to build him a machine in three months. They completed it in two—a monoplane with a Wright Whirlwind air-cooled engine of 200 h.p., a very ordinary and unspectacular example of aeronautics of the day. Lindbergh took one record on his first flight: 14½ hours from San Diego to St. Louis, in itself an excellent piece of aerial navigation which included desert, mountain and plain.

He took off from New York in a drizzling, misty dawn on May 20, 1927. An extra fuel tank blocked his forward view completely. He could only see ahead by using a periscope or by leaning out of the cabin window. On his transcontinental flight he had flown by compass throughout the night. When dawn came he was only 20 miles off course on a trip of 1,700 miles. For his transatlantic flight he relied on a compass course, calculating as best he could when each leg had been completed. He had good visibility as far as Cape Cod. Most of this section (and, indeed much of the remainder) was flown just over the wave crests. Touching St. John's so that coastguards could know he had reached that far, Lindbergh turned on to his Great Circle course, fog almost immediately compelling him to rise at times to 10,000 feet. With dawn he once again skimmed the waves, watching the direction of spume so as to check his wind drift. His first sight of land was Cape Valencia, County Kerry, with the Kerry Mountains behind it. He was five miles off his charted route. From then on he was observed continually on a perfect summer's day. Messages poured into newspapers which, in two continents, were printing special editions. He touched Land's End, flew along the Cornish and Devon coastline, turned South for Cherbourg and then had merely to follow beacons which the excited French were burning on the route to Paris. The message that he had crossed the French coast was passed to Paris newspaper offices at 8.30 p.m. The news was scrawled on boards in their office windows, and the crowds began to surge out to Le Bourget. The little *Spirit of St. Louis* circled the illuminated Eiffel Tower, hung around a little while the pilot pondered on the chances of flying on to Rome (he had fuel for another 1,000 miles) and then dropped into the airport. Some 25,000 people tore down the fences to greet him. He had covered 3,600 miles in 33½ hours.

The Lindbergh flight was, of course, unique. Nothing can be written to convince people that this was not the pioneer flight, which in spirit if not in fact is as it should be. Lindbergh flew non-stop. He arrived at his intended destination.

His aircraft was in perfect shape for further flight. The Flying Fool, one of the most cautious and careful airmen of his day, had mastered machine and elements. He had won a complete victory over the Atlantic.

Subsequent flights tended to become wearying and monotonous in their description, though they involved physical and moral courage. The earliest after Lindbergh's triumph was by Clarence Chamberlain and the financier of the trip, Charles Levine. They hoped to fly from New York to Berlin, actually landing at Eisleben, 160 miles short of the German capital. The press played up the story that Chamberlain found his way by circling low over the Atlantic liners, looking up their sailing dates in a copy of the *New York Times* he happened to have taken along, calculating how far on the voyage they must be and then using the ship's hull as a sign post for the right direction. Though it happened to be true, this sort of thing gave colour to the idea that providing you left one coast behind you were in time bound to hit the other on the far side.

The consequence was that every flight came to be regarded as some sort of adult prank. The flight from New York by Byrd, Bert Acosta, Bernt Balchen and G. O. Novill in a trimotored Fokker named *America* did something to correct this attitude. Their preparations were careful, wireless and navigational arrangements were the finest possible, and the men were all experienced in aviation. Although they kept on course during appalling weather over the ocean, piloting over fog-bound France defeated them. They reached Paris on two occasions but were compelled to return towards the sea as the safest place to land, and crashed, without injury, in the surf off Ver-sur-Mer, Normandy.

By this time it was obvious to all that there was one tangible result from flying the Atlantic: an immediate and considerable fortune. Fees for signed press articles, testimonials for everything from confectionery and patent drinks to fuel and sparking plugs brought in a useful harvest before the personal appearance tours. People who had never flown in their lives hurriedly looked for pilots to aid them on to this luxurious band-wagon. The death roll, often before the actual attempt was made, began to mount, and it was fortunate that business interests and patriots offering prize money did, in many cases, withdraw their offers.

Two French airmen, Coli and Nugesser, were killed on an East-to-West attempt. Another machine, which included a Hearst newspaper editor, took off complete with a wreath for the French airmen which bore the words: "You showed the way; we follow." It was unfortunately a prophecy. Four ships searched for them in vain after an S.O.S. was picked up in mid-Atlantic. Within a few hours of this tragedy, two Canadians, financed by a brewery, went into oblivion off Newfoundland. The Princess Lowenstein Wertheim, with an Imperial Airways pilot and a joy-ride expert, joined the casualty list. Their machine had been the object of a ritualistic blessing at Cardiff before taking off. It crashed somewhere off the Newfoundland coast. Another distinguished lady, Mrs. Grayson, niece of President Wilson, succumbed on Christmas Day, 1927, in the vicinity of Cape Cod. Ruth Elder was luckier. She and her pilot were picked up after wandering over 3,000 miles of ocean by a tanker in the Azores area. In the following spring, Elsie McKay, daughter of Lord Inchcape, set off with Bert Hinchcliffe from Cranwell and the only news of the machine's fate was a spiritualist's message that it came down near the Azores.

The public were becoming tired of Atlantic flights, and governments were getting less willing to provide facilities and clearance certificates. The attitude that if progress demanded willing sacrifice no one should interfere produced several cogent arguments against it from the world's wireless stations which had to interrupt normal traffic to listen out for the S.O.S. messages, and from shipping companies who abandoned sailing schedules and used up fuel looking vainly for a square yard or so of wreckage, usually in a stated position which was inaccurate by a hundred or more miles.

Such critics could cite the search made for the Frank Courtney flying boat. This attempt of an East-to-West flight was planned carefully. The machine, a Dornier *Whale*, was a proved aircraft, for it had been used by Amundsen in his attempt to reach the North Pole by air. Courtney waited some six months for suitable weather and intended to make the crossing in a series of hops via Portugal and the Azores. At the Azores he waited eleven days for good weather and even then turned back after five hours' flying because of adverse wireless reports on the Newfoundland conditions. After three weeks' wait he was off—and after twelve hours' flying fire broke out in one engine. The S.O.S. was answered by three liners and several merchant ships. They were nineteen hours in finding the machine. In this case, of course, the search was amply justified by the saving of life. It succeeded because of the care which the *Whale's* captain had taken to offset such an accident. It was an exception to the rule.

By this time the East-West flight had been achieved. An Irish-German crew took off from Dublin at dawn on April 12, 1928. They landed on an ice-covered field on Greenly Isle, Labrador, after thirty-seven hours' flying.

Transatlantic flights continued, of course, but proved little beyond the increasing speed of aircraft and the continuing courage of pilots, male and female. When passenger services began across the South Atlantic the public hardly noticed it. The Old World was sliding into war, and Europe's eyes were focused on Rome, Berlin, Munich, Danzig rather than the air of the Atlantic.

In the late 1930's the advance in aircraft design made a passenger service across the Atlantic feasible both on the safety and profit factors. The Empire air mail scheme inaugurated in 1937 linked the African colonies with the Motherland and South Africa; a regular passenger service ran between Bermuda and New York. In both North and South America, British, American and German air lines were providing coastal services, and, during July and August, 1937, proving flights across the Great Circle route of the North Atlantic were made. British Empire type flying boats and a U.S. Clipper flew the Hythe-Shannon-Botwood (Newfoundland)-New York route with complete success and little publicity. The fastest time, incidentally, on these flights for a double crossing was made by the *Cambria* flying boat: 14 hours 21 minutes (East-to-West) and 10 hours 35 minutes (West-to-East). But aircraft development was not sufficiently advanced at that time to render obsolete various schemes for refuelling en route. There were several plans for floating aerodromes in mid-Atlantic and the less-expensive idea of a pick-a-back aircraft. Britain's leading flying boat builders, Short Brothers constructed one for the Air Ministry. One seaplane was mounted on a flying boat which carried nothing but a modest supply of fuel. When the composite aircraft had reached 5,000 feet the heavily loaded "parasite" machine detached itself and flew off. In one test flight in 1938 the composite machine took off from Foynes (Co. Limerick) and the seaplane, with a load never previously attained by an aircraft taking off in the normal way, flew non-stop to Montreal.

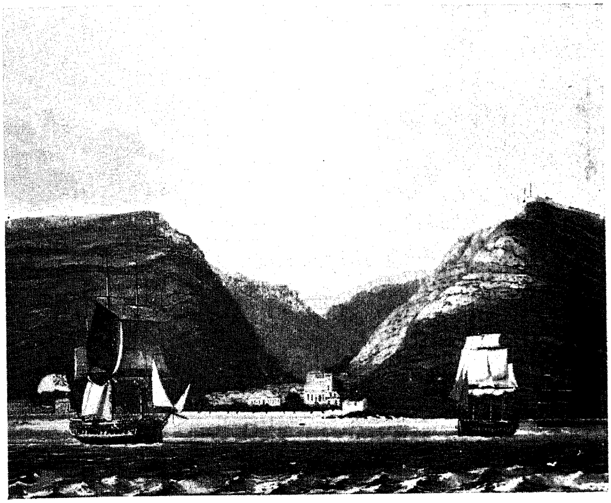
The war increased the tempo of progress for the aerial conquest of the Atlantic. From the first few months there were very few parts of the Atlantic shipping arteries which could not be patrolled. R.A.F. Sunderlands cruised from Scottish bases until they were half-way across; Catalinas did the same from the Western side. By 1943 Douglas C74 transports were able to fly the 1,500 miles from England to Oran with their heavy loads of airborne troops. This, the first allied offensive in which air power sweeping in from the sea to aid the armada of ships which had used the Atlantic as a highway none could successfully bar, had some parallels with the attack by the Portuguese on Ceuta five centuries before. The Atlantic was once more proving itself a gateway instead of a barrier.

The Germans lagged far behind in the air battle for Atlantic supremacy. Not until the closing months of the war did they begin to challenge the allied monopoly of oceanic air power. The Messerschmitt 264, blatantly copied from the U.S. Liberator, was designed to carry two tons of bombs from France to New York. It was not ready in time to indulge in this ineffectual and suicidal activity.

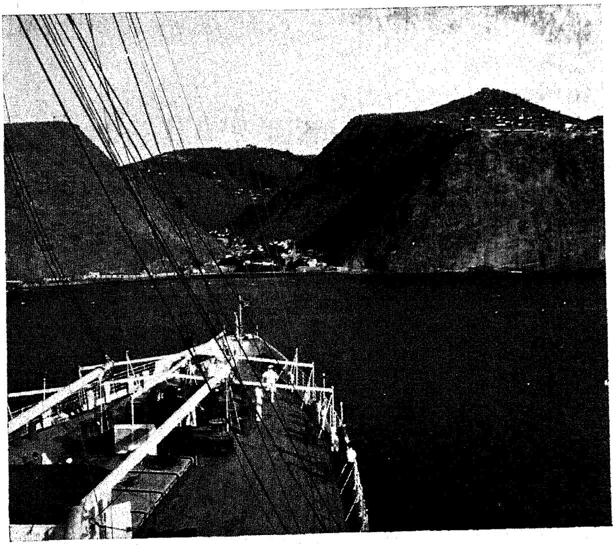
Compared with this late effort, the allied aircraft were winners by years. The British Stirlings, Halifaxes, Lancasters and even Mosquitos could span the Northern route between Canada and the British Isles, while the American machines, starting with the Liberators and the Boeing 17's, steadily increased their fully loaded flying range from around

2,000 miles to 4,100 miles with the B29 put into service in June, 1944. This aircraft, powered by engines totalling 8,800 h.p., was capable of flying at a cruising speed of 350 m.p.h. with an all-up weight of 67 tons.

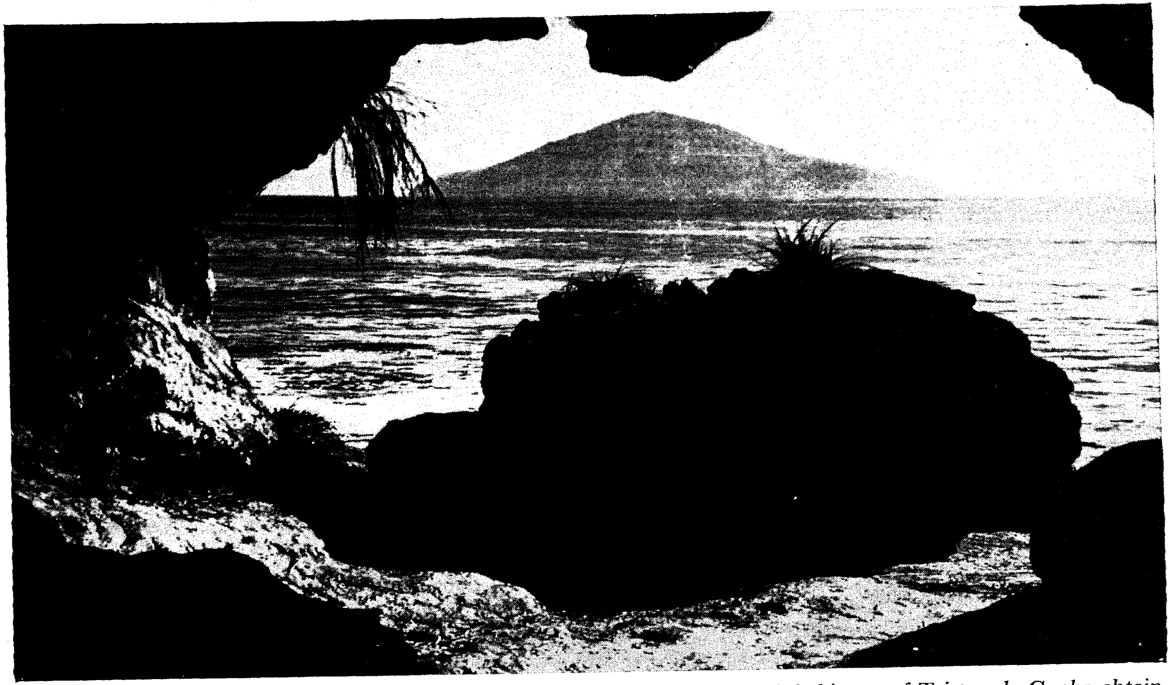
It was the supreme aircraft of the stream of 20,000 machines which were poured from Roosevelt's "arsenal of democracy" into its bastion of the British Isles. Unknown to the public, from the first months of hostilities the radar screens of stations of Northern Scotland and the Hebrides were flickering continuously with this never-ceasing procession of aircraft flying on the radio beams which spanned the Northern seas. They droned along a sky track which followed closely the sea lane of the Norse explorers of nine centuries before. From this terrifying strategy of war came the blueprint for the communications of peace. Where blacked-out bombers flew in 1945 the first air liners were flying on schedule by 1946, comfortable hotels of the air bringing two worlds and two capitals together in the travel span of a waking day.



31. The harbour at Jamestown, St. Helena, from an 1816 print



32. Jamestown to-day. St. Helena, once the island prison of Napoleon, 2,100 miles from the coast of West Africa, and one of the healthiest places in the world



33. Tristan da Cunha seen from Nightingale Island. From the latter the inhabitants of Tristan da Cunha obtain guano, birds' eggs and birds' carcases for oil

CHAPTER XII

IN ANYTHING BUT A SHIP

If legends always have a basis in fact then it is possible that the stories of castaways on the Azores, Ireland and so on, which Columbus and other explorers quoted as proof of lands beyond the Western horizon, were true. More likely still are the legends of the American Indians and Central American civilizations of lone visitors from the sea, for a drift West, aided by the N.E. and S.E. Trades, would almost certainly carry a seaworthy craft to land. Many people know the pleasure of a cruise to the Caribbean. Once the Bay of Biscay is astern the Atlantic can be gentle and kind. These conditions made the passage of the West Indiamen a delight, instead of an ordeal as it was farther North, from early times. The vessel was painted, deck awnings erected, and the ship bowled along on an even keel. Nothing would stop her eventual arrival in the West Indies. Much European driftwood and wreckage is found on the Caribbean; on occasion complete ships. A remarkable case was that of a nineteenth-century sailing vessel, abandoned during a gale. She was the *Alma Cummings,* seen later in the Bay of Biscay, then off the Azores and finally found on the shore in the Isthmus of Panama.

Dr. Alain Bombard is, of course, the best-known of the trans-atlantic drifters on this route. His crossing took sixty-five days from the Canaries to Barbados, and on the theory of current speed this was a long time. But Dr. Bombard was, of course, making an experiment and did not help his craft along, as any early involuntary voyager would have done. Further, his rubber dinghy was probably not so amenable to marine propulsion as a canoe. Most remarkable was his proof that a crossing of this duration could be made without food or water. He lost four stones in weight, but he maintained life—and even health—with raw fish, plankton, and sea water to drink. Actually Dr. Bombard once had food from an external source. After 53 days he met a British tramp and enjoyed a hot meal before setting out once more.

The Bombard endurance test, designed to prove by example that shipwrecked sailors need not despair, had been undertaken in the Atlantic in 1943 when three of the crew of a torpedoed ship drifted about the Atlantic for 67 days. They were two Dutchmen, Cornelius van der Slot and Nicholas Hodgendam, and an American Dominic Izzi. In this period they lived on sea birds, fish, and rain water. When they were picked up they were in the South Atlantic and many days' drifting from land.

A faster but foodless crossing occurred in 1797 when four of the crew of the Liverpool slaver *Thomas* escaped from the ship in a longboat. When a little distance out from Africa the slaves ran amok and, after killing most of the crew, forced the remainder to sail the ship back to Loango. The four who got away by boat went without food or water. They reached Watling Island safely.

A more grisly story is that about six British soldiers who deserted from the garrison at St. Helena in 1797. The leader of the enterprise was a man named M'Kinnon, and he prevailed upon an ex-seaman named Parr to come as pilot. The original scheme was to escape on an American brig lying off Georgetown, the *Columbia.* In view of the strained relations between Britain and America at the time the captain was not unwilling to help, and the six men were taken aboard on June 10. But the American could not weigh anchor there and then. The soldiers, terrified that their absence from the garrison would quickly result in a search of the ship, with certain execution if they were discovered, went back to the shore at night and stole a decrepit longboat. A hurried foray along the beach produced five oars, a coil of rope, a stone for an anchor, 25 lb. of bread, and a 13-gallon keg of water. Parr brought along a compass and a quadrant. With this unsatisfactory equipment and in a leaky boat they pulled out to sea while it was still dark.

Their intention was to drift up and down just beyond the horizon until the *Columbia* came out, when they knew they would be taken aboard. The weather deteriorated and after 24 hours they had to admit that they had missed the ship. With a boat half full of water and handkerchiefs tied to two of the oars as a sail they started for St. Helena, about 800 miles distant. After a week Parr confessed that he had very little idea where they were, but was fairly certain that they had missed St. Helena. He suggested that they should try to make Rio de Janerio. On June 18 the rations were cut to an ounce of bread and two mouthfuls of water. On June 26 all the bread and water were gone. They chewed pieces of bamboo which drifted past, and that night tried chewing boot leather. Both sources of nourishment were, however, so impregnated with salt that they were sick.

On July 5 M'Kinnon proposed that they should draw lots to decide who should be eaten. One man, suffering from fever, was omitted as his flesh was considered unhealthy. M'Kinnon drew the fatal lot and opened his veins, dying in a quarter of an hour. The contemporary recorder of this Atlantic journey considered that "M'Kinnon's melancholy fate was a memento to soldiers and sailors, and a useful lesson to encouragers and abettors of desertion". His smug satisfaction in rudimentary justice for the ringleader of the enterprise and the proposer of cannibalism is possibly less interesting than the astuteness of M'Kinnon in making suicide a rule for the victim. There was, and is, apparently no law against eating human flesh, though normally of course a charge of murder would stand. In this instance a nice legal point as to whether the drawing of lots was a suicide pact and the survivors were guilty of murder arises. However that may be, M'Kinnon provided the others with several meals, the body being immersed in the sea to keep it fresh. On July 8 they sighted an island in the Bahamas. Two men were drowned in the surf, being too weak to stagger out of the sea. The remaining three were thought to be French and were taken prisoners. One man, John Brown, made up a circumstantial story about being the master of a Liverpool ship which had foundered. They were then released and taken to San Salvadore where general sympathy for their misfortunes resulted in a public subscription of £200. With this money they bought passages to Lisbon. Brown eventually confessed the facts of the case, and so far as is discoverable no action was taken against them, probably because they kept out of British territory for the rest of their lives or changed their names. The Napoleonic wars were in full spate, and deserting soldiers aroused little comment in Europe. The soldiers of St. Helena were extremely lucky to survive the Doldrums, and it appears that they must have rowed steadily despite their weakness. Otherwise they might well have drifted about for weeks, having to eat one another until only one was left.

Rowing across the Atlantic has succeeded as a deliberate enterprise. In 1896 two experienced American sailors of Norwegian origin, Frank Samuelson and George Harbo, set out from New York for England, their object being to make money by exhibiting their boat and lecturing about their experiences. The project was planned with extreme care. Harbo was a harbour pilot; he spent months studying Atlantic currents. Samuelson, the boat-building expert, designed a craft which was seaworthy and manageable in rough water. He estimated that it should be possible to cover fifty-four miles a day, relying on an extra knot from the Gulf Stream and the North Atlantic Drift. This distance would demand twelve hours actual rowing a day, with two rest periods of one hour each, and sleep through the night. As subsequent lone travellers have discovered, this nocturnal unmanning when on the Great Circle route presents dangers greater than those of wind and waves, for running down or submersion from the wash of a ship is possible, even probable.

The boat Samuelson designed was an 18-ft. double-prowed craft very like a whale boat. Buoyancy and water tanks were fitted at each end, and there was a canvas storm-covering which could transform the boat into a sort of kayak. Everything was lashed down so that even if the boat capsized (which it did) nothing would be lost. On board were 500 lb. of food, 60 gallons of drinking water, kerosene and a stove for cooking, surplus oars, and first-aid equipment. The financier of this enterprise was an unlikely one: the proprietor of the *Police*

Gazette. His name duly appeared on the prow: *Richard K. Fox.* He obtained excellent publicity for his magazine, for thousands watched the boat set off from New York Harbour on June 6, 1896, using the ebb tide to carry them on the first stage of a 3,250 mile passage. Apart from the night when the boat capsized, the journey went much to schedule. They reached Plymouth via the Scilly Isles in 55 days, about four miles a day better than they had estimated.

For the comfort of those inoculated with the virus of breaking records it should be mentioned that technically this was not a non-stop row across the Atlantic. The two men accepted the invitation of a Norwegian ship master in mid-ocean to come aboard for half an hour and exercise their limbs.

Exhibitions, for some reason, seem to spur amateur sailors to stunt crossings of the Atlantic. The American Centennial Exhibition at Philadelphia in 1876 was advertised by the successful crossing from Boston to the Bristol Channel in 56 days. The voyager, a Newfoundland fisherman named Johnson, used the virtually unsinkable Banks dory for his trip. Two years later the sponsors of the Paris Exposition were delighted to learn that a piano tuner of Boston was planning to visit the show in his own boat. With his brother Walter, Bill Andrews bought a dory-type boat which they named *Nautilus.* It was fitted with a lateen sail. Like the aeroplane stuntmen of fifty years later, the Andrews brothers did not bother overmuch about navigation but relied on hitting the coast of Europe somewhere, and they steered by compass only. Their route, from Beverly Harbour, Massachusetts, in the direction of the English Channel was, of course, in the shipping lane, and they had some helpful advice from passing and overtaking ships. With this aid, with a lot of luck, and even more common sense, they reached English waters in forty-four days, and later received a big welcome at the Paris Exposition.

Bill Andrews made Atlantic crossing a profession after this success, which brought considerable financial benefits. He purchased a smaller boat in the following year and sailed by himself. The weather was continuously bad, and when he was picked up after two months at sea he was only about two hundred miles from the American coast. In the summer of

1891 he again failed. The next year Spain was arranging ceremonies on both sides of the Atlantic to commemorate the four-hundredth anniversary of the first voyage of Columbus, and Andrews persuaded an American soap manufacturer to finance him on an attempt to cross in a collapsible boat about 15 ft. long. He cut the distance by starting from Newfoundland and reached the Azores in a month. The remainder of the passage to Lisbon and thence to Cadiz was a triumphal progress. Altogether Andrews started on seven crossings. He got married in 1901, set out in a 20 ft. boat with his bride for another passage to Spain, and was lost at sea.

In connection with the 1951 Festival of Britain two Englishmen, Stanley Smith and Charles Violet, sailed from the Thames in a 20 ft. yawl, the *Nova Espero*. After fitting at Yarmouth, Isle of Wight, they put in at Dartmouth for stores and started the actual passage on May 24. The passage was a difficult one, and they were not able to leave for the last stage to New York from Nova Scotia until August 11. On arrival in the harbour waters they had to wait for customs clearance before they could land. Such are the problems for unconventional sailors to-day. For the coastguards they are even greater. A tender regard for the welfare of people bent on near-suicide regularly involves the taxpayer on both sides of the Atlantic in expensive searches by aircraft and ships. Police have a wise habit of discovering some obscure discrepancy in the papers or of digging up a regulation about exit permits which restrains the more bizarre voyagers.

There are those who bewail the end of freedom as thereby exemplified—and still more who talk vaguely about the death of the spirit which inspired the seamen of the Tudors. One fails, however, to discover any explorer who did not take the best available craft he could get, or sailed a mile into the Atlantic without some objective which might produce a profit to himself or his country. The Bombard experiment was an exceptional effort with a useful reason behind it, as was the Kon Tiki expedition across the Pacific. There seems, however, little advantage to humanity in most of the twentieth-century stunt crossings which are, in any event, imitations of earlier passages. In two Atlantic wars too many men have had to endure the loneliness of boats for much merit to be apportioned to a deliberate action for pleasure and publicity.

In any event, it is difficult to find any method likely to arouse public interest and thereby bring in the revenue from books and advertising. The stunt crossing to end all crossings occurred when two people motored across. Major Ben Carlin and his wife achieved this conquest of the Atlantic in 1950. They used an amphibious jeep bought for £320 from an army museum. A tow tank for fuel was built in the shape of a large cigar, a false prow was fitted in front of the radiator, a glass cabin top over the driving seat, and the body was covered with synthetic rubber. This contraption was appropriately named *Half Safe,* and after evading the attempts of the police to prevent what was regarded as an expensive method of self-destruction Major and Mrs. Carlin set off from Halifax, Nova Scotia, on July 19, with sufficient food and fuel to reach the Azores, 1,800 miles distant. As might be expected, the *Half Safe* was difficult to steer, and was physically tiring to keep on course.

The couple reached Flores in 31 days, and went straight on to Fayal where the first amphibious machine to cross the Atlantic was driven out of the water and into a garage for repairs. Like many a voyage in the days of sail, Major Carlin was soon to learn of the wayward temper of the weather between the Azores and Madeira. The 520 miles of this section took twenty-three days, and the Jeep was driven far to the South-West during a two-day hurricane. Eventually they drove ashore at Cape Jubi, West Africa, sixty-three days out from Nova Scotia. At their leisure they motored through Africa, across the Mediterranean, through Europe, across the Channel, and eventually to Piccadilly Circus. One's only regret is that this remarkable passage had not started from Times Square, New York.

CHAPTER XIII

ISLANDS AND ISLANDERS

LONELY islands are scarce in the Atlantic compared with other oceans. Nearly all the distant islands are of volanic origin, and differ geologically from those which lie on the continental shelf. The islands off the West coast of Scotland—and the British Isles themselves—are like Newfoundland, Cuba and many of the West Indian islands: merely sea-surrounded pieces of the continent close to them. The spectacular examples which interested early explorers on the Eastern side of the Atlantic, isolated pieces of land in a raging sea like the Faroes or the lonely tower of Rockall, are fragments of lava which piled itself up in geological times when the entire area as far South as Scotland was covered with it.

The sparsely scattered islands which appear as dots many times their relative size on any map of the ocean are mostly the peaks of the Mid-Atlantic Ridge which runs from the Southern tip of Iceland almost into the Antarctic Ocean. Here and there isolated peaks also exist. Two hitherto uncharted mountains were discovered in a post-war survey by H.M.S. *Cook*, which carried out research North of the British Isles. The submerged mountains lie in an area midway between the Orkneys and Spitzbergen, the peaks 1,800 ft. below the surface and their height above the ocean bed some 12,000 ft.

The Mid-Atlantic Ridge was discovered when attempts to lay a cable between Valencia, Ireland, and White Strand Bay, Newfoundland, between 1857 and 1866 brought continual failure. The plans had been made on the theory that the ocean was fairly level beyond the continental slope on each side. Construction of a cable strong enough to withstand the enormous drag of crossing chasms and snaking up and down the sides of the mountains was a technical problem which had not been envisaged. On three occasions the cable broke.

The news that this giant range existed revived all the stories of the mythical Atlantis. Modern geologists and anthropologists do not take the myth seriously, for there are ten times as many objections to it as pieces of evidence in its favour. Any writer makes such a critical statement at his peril. The existence of guyots—submarine mountains the summits of which have been worn away by wave action—are a discovery of the last twenty years. They occur in the Pacific as well as the Atlantic, and are usually 3-4,000 feet below the surface. Either the world's seas have risen or the sea bed has sunk by that amount. Without this unexplained scientific data the Atlantis theory is one which arouses the most fervent excitement in the minds of its protagonists, and to question its truth is as risky as doubting the prophetic properties of the Pyramids, suggesting that the Lost Tribes of Israel just died out, or that flying saucers are a figment of mass hysteria.

Proof of the existence of Atlantis would destroy all present theories of human evolution, and most of those of geological history. The Atlantic islands which are presumed to be the relics of this great civilization mark the course of the Mid-Atlantic Ridge—the Azores, Madeira, Canaries, St. Helena, Tristan da Cunha. It must be said, before any romantic details are set down, that none of these islands, noble peaks of a noble continent where it would surely have been likely that some shrine of man would have built, bear any trace whatsoever of a prehistoric civilization.

Apart from the world-wide legends about a great flood, the earliest detailed account of Atlantis is that of Plato, written in 400 B.C. The best one of modern times is that of Ignatius Donnelley, whose works so excited William Gladstone that he wanted to send an expedition to find Atlantis. The Treasury turned down the idea on the grounds of economy. Apart from these leading authorities on the subject the world's museums and libraries have been crammed with the views of 5,000 others. On few other subjects has such a mass of nonsense been written around a kernel of truth. All take Plato's description as the basis of research. But Plato's famous

Dialogues, the Timaeus and the Critias, must be suspect because he obviously wrote for precisely the same reason as Swift wrote *Gulliver's Travels* or More penned *Utopia*. He had a political axe to grind. Nevertheless Plato was no fiction writer, and it is difficult to understand why, if it was a work of imagination, he troubled to explain that his account was based on details given to his ancestor Solon by Egyptian priests.

Plato puts the date of the destruction of Atlantis " in a day and a night " as 9600 B.C. If this date is even approximately accurate (the modern theory puts the date back to 15000 B.C.) then the information was handed down verbally. No Egyptian records so far discovered go back further than 6500 B.C. One point in favour of the Egyptian priest story is that it did locate Atlantis vaguely in the position of the Atlantic Ridge. Until recent times the theories, apart from the legends of still existing lands in the ocean, placed Atlantis in other parts of the world, usually on land. A French writer wrote an impressively convincing treatise that it was in North Africa, and the German explorer Frobenius spent an exhausting thirty years trying to find traces of it in the Ife territory of Africa. Others place it in Spain and cite the Spanish cave paintings as examples of a culture far beyond anything prehistoric man could accomplish. The protagonists of the mid-Atlantic theory dismiss such traces of land as relics of trading outposts of the main territory. These alleged merchant colonies provide the richest source of material to justify the Atlantis theory. From them, it is suggested, came the flood legends—stories told by survivors of the greatest disaster in the history of man. It is certainly true that the flood stories on both sides of the Atlantic bear a remarkable similarity. They occur in the Norse Sagas, the Eddas legends of the Aztecs, Mayas and Toltecs of Central and South America, as well as in the records of the Israelites and Babylonians.

Other practices of the Atlanteans are supposed to be identifiable in the peoples who live on Atlantic coasts to-day. They were sun worshippers, and their religion was carried on in North Africa, Western Europe and Central America afterwards, often with a deep knowledge of astronomy out of all proportion to the rest of the culture of the peoples. They were supermen with flat skulls—and in Brittany and among the Indians of Central America the practice of bandaging children's heads is still practised—the only possibly reason, say the enthusiasts for the Atlantis idea, for this meaningless ritual being to give the child an aristocratic appearance like the master race of the mid-Atlantic.

Literally hundreds of rather peculiar details in favour of Atlantis are available, of which the jade mystery is typical. Jade, so far as anyone can discover, exists in Amerca only in British Columbia and Alaska. But jade ornaments have been found in the Maya tombs of the Yucatan peninsula of Central America. In the earliest tombs the pieces are quite large; in the later ones they have been cut from larger ornaments and become progressively smaller. The source of jade was evidently cut off.

Two suggestions are put forward to account for the disaster which overwhelmed Atlantis. The first is that originally the moon was not a satellite of the earth, but a planet describing an orbit between those of the world and Mars. The moon was captured by the earth and retained as a satellite, the change being accompanied by tremendous upheaval. The poles shifted slightly and enormous masses of water were moved by gravity to a new area, raising the ocean level near the Equator by many hundreds of feet. In a matter of hours Atlantis was engulfed.

This idea is contrived to justify Plato's insistence of overwhelming disaster in twenty-four hours. No conventional astronomical view justifies it. But science cannot absolutely deny the second idea, which allows for a steadily increasing water level. About 15000 B.C., it is said, Venus moved from its previous orbit and became involved with the earth. This view is coloured, of course, by the fact that Venus does approach closer to the earth than any other body except the moon and an occasional comet, and its path can lie within that of the earth so that periodically it passes between the earth and the sun. It last happened on December 26, 1882 and will occur again on June 7, 2004. The suggestion is that once Venus came so close that its immense clouds of vapour reached the earth's atmosphere and caused unparallelled periods of rain.

Short of submarine exploration at depths of 12,000 feet or more the mystery of Atlantis is not likely to be solved. Even if something could be found on the mountain slopes at a level where investigation was possible it would tell little. To discover an artifical ledge below water level on the coast of Funchal, for example, would provide as much information about this alleged lost civilization as a climber's hut on the top of Mont Blanc would tell a future explorer about the civilization of to-day in Europe.

The islands which are supposed to be the relics of Atlantis can attract on their more recent history and present charm quite as much as on legendary importance. The Azores could well justify a premier place for majestic beauty. It is possible that the Phoenicians colonized this group of ten islands, though they were not re-discovered until the fourteenth century by the Portuguese. Mount Pico, whose peak with its wisp of clouds in an almost perpetually blue and sunny sky of this fertile group, towers 7,600 feet above the sea, is actually one of the greatest mountains in the world. Its sides drop for 20,000 feet to the ocean bed.

Madeira and its islands, little more than 500 miles from Lisbon, provide excellent proof of the fear of oceanic voyaging in the early centuries of the Christian era. Although the island was known to the Carthaginians probably in the fourth century B.C. and may have been colonized in 80 B.C., it was not sighted again until 1270, and not explored until 1420 when Goncalves Zarco and Tristao Vaz annexed it for Portugal. These men were not really seamen, but young courtiers who acquitted themselves with distinction when Portuguese forces stormed the Moorish stronghold of Ceuta. Their voyage was the first success after a series of failures in Atlantic enterprises organized by Henry the Navigator. Their vessel was a tiny caravel. The intention was to coast down the African seaboard, but the ship was blown Westwards for two nights and a day, helpless and with all sails stripped away. At dawn the crew found themselves in a charming bay of an island which they called Porto Santo (Holy Haven). The first governor was Perestrello, whose daughter married Columbus. The governor took a pair of rabbits with him. Within two years the place swarmed with them, and the colonists abandoned the island until ordered back. Zarco and Vaz were among the inhabitants of Porto Santo, and though the island they were to name Madeira was only 30 miles to the South-West it was some time before they visited it. In calm conditions clouds banking above the island could clearly be seen from their houses, and there was a circumstantial story from Portuguese sailors rescued from slavery at Ceuta of an English sailor named Robert Machin who had been cast ashore on the island with his bride and had died there, his companions later escaping, only to be captured and enslaved by the Moors.

The exploring Portuguese saw Madeira as many a tourist has since seen it. Heavy morning mist shrouded the island until the warming rays of the sun suddenly destroyed it—to reveal one of the loveliest of the world's places. It was so lovely, indeed, that the crews refused to launch boats because they were convinced that the place was enchanted. Once they had overcome their fears, however, they realized that they had discovered a worldly paradise, and soon afterwards they were back with their wives and families, farming equipment and animals. Then disaster overtook them. They started fires to clear the undergrowth and a steady Westerly wind fanned the blaze until the entire island was a holocaust. The colonists had to spent entire days crouching in streams to avoid death. These fires continued sporadically for thirty years, but they did not prevent the fertile land from yielding from then till now on a scale which almost baffles description. The vines, incidentally, which have made the island's wine world-famous, originally came from Crete.

The Canaries covering nearly 3,000 square miles are islands whose beauty must be seen to be believed. The old names of Fortunate Islands, the Isles of the Blest, are redolent of their appeal to the visitor. Seven large islands are in the group with Palma probably the loveliest of them all. Teneriffe has been a sign-post for generations of sailors; its white peak, rising 12,000 feet into the azure blue of the sky, is visible up to 100 miles away.

These islands are symbols of the gateway to another world. On Ptolemy's famous map they are marked at the very edge of the known world. Columbus and his crews were becalmed between Teneriffe and Comera on September 6, 7, 8, 1492, until a North-East wind enabled the ships to set out into the unknown.

As in the case of other islands in the Eastern Atlantic, the Canaries were seen and explored in the pre-Christian era. They were by chance re-discovered in 1270 by Malocello, and a long dispute on ownership arose between Portugal and Spain, the islands going to Spain in 1479 by treaty. There is an element of mystery about the inhabitants of the Canaries when the Portuguese arrived. These fierce people, who were skilled farmers, lived on three of the islands. They used war paint and forced the European colonists to remain on four uninhabited islands. Gradually, however, the Portuguese enslaved or killed them off.

The Cape Verde Islands were, like the Canaries, an accidental discovery. Luigi Cadamasto, a Venetian merchant mariner financed by Henry the Navigator, had carried out a number of successful trading voyages as far as Gambia by 1455. In standing out to sea on a later voyage so as to avoid the shoals off Cape Blanco the three ships of his expedition were caught in a storm and blown steadily South-Westwards. The islands they found were uninhabited by human beings so far as they could discover, though they found large numbers of turtles, and plenty of water.

St. Helena, a tricky place for the seaman because unpleasant currents swirl around its cliffs, which range from 600 to 2,000 feet, is quite unjustifiably cursed with a bad name because of its association with Napoleon. Compared with the prison provided for Nazi leaders, the Little Corporal was really very lucky, for not only are the 47 square miles of this island very beautiful, but his captors did their best for his amusement. I like best the story of the shuttered window, which can still be seen. To relieve their prisoner's boredom English officers laid out a racecourse. Napoleon's reply was to have every window shutter closed whenever racing took place—but he had a small hole bored so that he could look just the same.

The island's use as a prison began soon after the Portuguese discovered it in 1502. A political offender lived there in exile from 1513 to 1546, and shortly afterwards Dutch East Indiamen used it as a resting place. They avoided it whenever the weather allowed them to push on, for transporting wood fuel and water was a difficult and dangerous job, and on account of this disadvantage they made no attempt to annex it. When the East India Company found it advisable to organize strategic bases they simply built a fort commanding the only bay, naming it St. James's in honour of the Duke of York (later James II). For more than a century it flourished as a supply and repair base. But its place in history continued to be as a really safe prison. Boer prisoners were taken there in the South African War, and the delicate problem of what to do with African chieftains who became troublesome has often been solved by providing them with a life of leisure and harmlessness in this charming and fertile island of the South Atlantic.

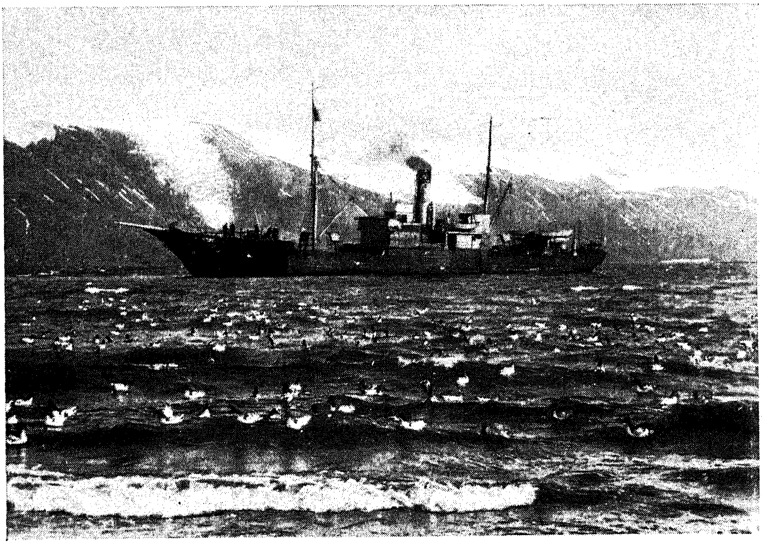
Little can be said in favour of Tristan da Cunha, named after the first Portuguese Viceroy of India, who, more by luck than judgment, discovered Tristan on the outward passage to India and Ascension Island on the way home. Tristan da Cunha is not, as most people seem to think, a solitary island, but one of a group of three. The main island is a massive extinct volcano rising to 8,000 feet from the sea-girt base of a dozen miles around.

The island used to be visited with far more regularity than to-day. The hundreds of thousands of seals which came ashore to breed made it a veritable El Dorado. One English ship remained there for nine months; killing about 6,000 seals before the animals left for their winter haunts. That was in 1790, and the story of this success brought other ships to the area until the massacre reduced the number of seals so severely that it was hardly worth while to make the voyage. In the early days of the nineteenth century, two Massachusetts whalemen, Williams and Lambert, decided, for reasons best known to themselves, to settle there. Lambert appointed himself king over a subject population of one, and sovereign and subject seemed to have lived in perfect harmony until both were drowned on a fishing expedition. Shortly afterwards Yankee privateers used the island as a store dump and hide-out for their forays against British ships on the India run. As a result the Royal Navy annexed the group of islands in 1816 and put a garrison ashore. When military defence was no longer necessary a Corporal Glass with his wife, two children, and a couple of soldiers decided to remain.

Glass was a remarkable man. His little community was steadily augmented by the arrival of shipwrecked sailors, men on the run for some reason or another, and, to the relief of the benevolent autocrat who ruled this little community, a group of negresses from St. Helena. Five bachelors immediately married the five dusky beauties, and so begat a mongrel race where the blood of every human group has since intermingled, though British ancestry can now be traced in all of them through intermarriage.

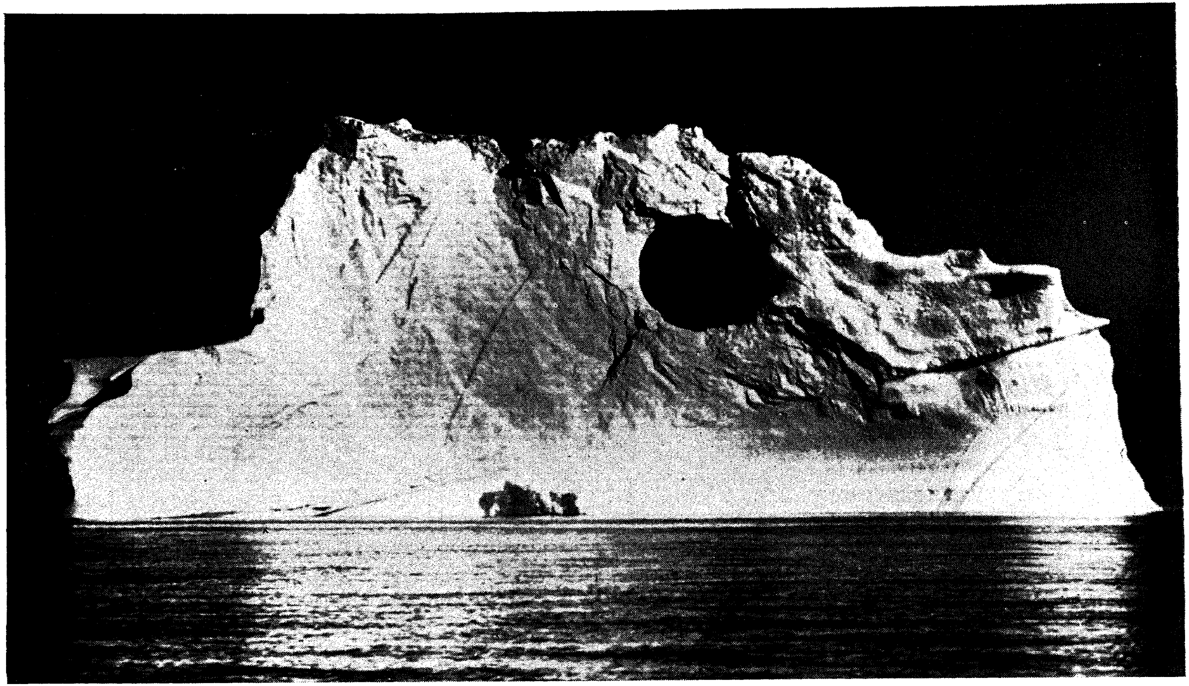
Glass ruled Tristan for thirty-seven years. Without written laws, but with the sense of discipline of a soldier who had fought in the Napoleonic wars and with the gentleness of a deeply religious Christian, he transformed the island into a modestly prosperous and very happy community. The cottages looked like something in a Cotswold village. They were robustly built of stone with thatched roofs. Gardens surrounded them. Cattle, sheep and pigs and goats provided meat, milk, and clothing. Seal hunting provided other necessities by barter, and in turn Glass's subjects received their due in exchange for the work they did on behalf of the community. After his death the community of one hundred people lost something of the inspiration he had given them, and twenty-five emigrated to America to work on the whaling ships. In 1857 forty-five more left for Cape Colony. The thirty who remained were almost forgotten, particularly when Confederate warships made it almost impossible for the Yankee whalers to penetrate so far South, and for twenty years a slowly approaching doom permeated the island.

Belated recognition by the Mother Country, when the Duke of Edinburgh visited Tristan da Cunha, revived outside interest in the island and also refreshed the islanders' spirits. Once again people went to live there, and the population



34. The *Eagle*, a Newfoundland sailing steamer, on survey work off Deception Island, in the South Shetlands

35. Adelie Penguins at Hope Bay, Graham Island, site of a base for Antarctic exploration in the Southern Atlantic



36. The biggest menace to shipping in the North Atlantic—ice. This berg is about the height of a twenty-storey building above sea level. The wavelets in the foreground indicate that its base extends horizontally for a much greater distance than its visible height. It was this underwater ice which sliced longways on the keel of the *Titanic*, rendering watertight bulkheads useless

reached a record of 109 in 1880. Misfortune struck hard when a ship was wrecked and some rats got ashore. They bred at an enormous rate, and destroyed the root crops. On top of this fifteen men were drowned when a boat capsized ferrying goods from a supply ship and thus virtually annihilated the adult male population. Since then, thanks to radio and the voluntary aid of the shipping lines, Tristan da Cunha's little population has carried on in its modest, unspectacular way. While youngsters are often tempted to emigrate to Africa, there are others who find whatever it is that has fascinated settlers there since the reign of Glass—and they go to stay. I doubt whether the dreary, austere and chilly Tristan da Cunha will ever be deserted. It has its own sort of peace which more presentable parts of the world cannot offer. Anyway, while submarines exist it is unlikely that Britain would ever permit this potentially valuable base to be abandoned.

Sixteen miles off Tristan da Cunha is Inaccessible Island, with a few narrow beaches where it is just possible to land. It seems improbable that any sailor would deliberately choose to visit this island if he wished to land anything but himself and a pile of wreckage, which is adequate reason to discount the inevitable stories of pirate treasure hidden on Inaccessible Island. It has, however, some typical stories of castaways. On a foggy morning of July, 1820, an Indiaman bound from Bombay to London drifted off course and before anything could be done had piled herself on the rocks. Though the weather was dead calm the tremendous swell of the Atlantic pounded the *Blenden Hall* to pieces in a matter of hours. There were sixteen passengers and sixty-four crew. Two sailors were killed when the ship broke in two, but the remainder got safely ashore. They landed with nothing but the clothes they wore, and could not even save a few weapons. Consequently they were in the position of seeing unlimited quantities of seal meat floundering a matter of yards from them but had nothing with which to kill them or prepare the flesh. The myriads of sea birds, perfectly tame, kept them from starvation. In the true Swiss Family Robinson tradition bales of calico and other merchandise floated ashore from the wreck and they were able to construct tents.

Regrettably many casks of spirits also arrived quite safely, and most of the crew drowned their sorrows in a days-long carousal, to the jeopardy of discipline. It was said later that the handful of women passengers made as much trouble for the unfortunate Captain Greig, without the aid of alcohol, as his unruly crew achieved when roaring drunk. Crouching in a calico tent while the rain fell interminably can hardly have been conducive to charm of manner or tolerance of one's neighbour.

Nothing serious, however, occurred during the first two months of isolation, by which time some of the men had explored the island thoroughly. From the summit of the mountain they were fortunate to get a glimpse of Tristan da Cunha during a brief clearance of the weather. The cook made himself a boat, unsuitable even for one passenger, but four of his companions crammed into it and sailed to almost immediate disaster and death. The ship's carpenter began work on a more robust craft, and ten more of the crew tried their luck. They were successful in reaching Tristan da Cunha, and within two days William Glass arrived to rescue the castaways. He spent a week ferrying them all to safety, and probably soon tended to regret his action, for the passengers and crew complained about the food, the work they were given, and their living accommodation. Glass was compelled to put up with them for three months, when a ship arrived and he thankfully escorted his dissatisfied guests on board.

A number of back-to-nature enthusiasts have tried Inaccessible Island for their experiment of dispensing with the world and all its civilized troubles. Two Germans went there in 1871, and received practical help and advice from the people of Tristan da Cunha. They stuck it out for nearly two years, by which time they had eaten the island practically bare. But for the fortuitous arrival of Darwin on the *Challenger* they would probably have died from starvation. They thankfully returned to the civilized miseries of Europe.

The inappropriately named Nightingale Island is ten miles from Inaccessible. It is the smallest of the islands and quite unsuitable for habitation, but somewhat easier to land on.

If any treasure story about the Tristan da Cunha group is true then Nightingale is a likely place.

The best Atlantic island on which to gamble large sums of money in the hopes of finding treasure is undoubtedly Trinidad Island (not, of course, the British island off Venezuela), twelve square miles of volcanic horror lying about 750 miles East-North-East of Rio de Janeiro and well off the shipping routes. The story is that Spanish Royalists, fleeing from the victorious Bolivar, set out in a mixed fleet with every piece of treasure they possessed. The news of their preparations was known to every pirate on the American seaboard, and a motley crowd of ships lay in wait for what was to be one of the last and greatest treasure convoys from South America. Almost all the fleeing ships were captured, and the treasure hidden on Trinidad. How they managed to get heavily laden boats ashore is a matter for conjecture, but they are supposed to have used a small bay on the South-West tip, burying the treasure under the lee of a hill which rose almost from the shore.

The usual story of fights which left only one man with the information of the location of the treasure follows—and there is even the dying gesture of presenting a map to a benefactor. In due course this fortunate recipient's son went to look at Trinidad—and found that the map was at least accurate geographically. This was valuable confirmation, for one would have searched the world's archives in vain for an accurate map of the island at that time (1880). The treasure spot was, however, covered by a comparatively new landslide.

A number of attempts have been made to shift the rock. Money and human endurance have run out before any real impression on the thousands of tons of rock and earth has proved or disproved the story. The place is extremely well protected by myriads of insects, some of the largest land crabs in existence, and tropical heat. But as a treasure island Trinidad undoubtedly offers better prospects, and is based on a more reliable story, than the famous Cocos of the Pacific.

Ever since the days of Drake and Ralegh, it has been generally agreed that Tierra del Fuego is the most unpleasant place on earth. The Falklands, two hundred scattered islands, which lie 300 miles to the East, appear by reputation to have been affected by that unpleasantness. In fact, a Briton visiting them without any information other than the usual schoolbook report of "austere, treeless islands" will be most pleasantly surprised. He could hardly reach farther South under the Union Jack, yet he can easily imagine he is in some part of Britain. The Falklands' distance from the Equator is the same as London, and both scenery and climate bear a remarkable resemblance to North West Scotland. It rains on three days out of five and the Westerly winds rarely cease to blow. Everybody is of British stock, and the majority are Scots: they have travelled across the world to find somewhere that reminds them of home. In point of fact the sunshine figures for the most Northerly of the Falklands is slightly better than England's annual average, and in the summer the weather can be really magnificent. I remember a January afternoon when I climbed above the little town of Stanley and looked across mile after mile of yellowing grass to the grey crags rising from an azure blue sea, broken to snowy whiteness at the edge. It was a replica of the Caithness coast on Pentland Firth. The South-West and North-East extremities of the Atlantic, an ocean apart, are very similar.

The island's capital, Stanley, hardly mentioned in the world's news except when global strategy makes its little harbour a base for British ships hunting enemy raiders, as it has been in two world wars, is a charming little town nestling on the side of a steep hill. White-walled houses, built to the exact design of the crofters' and fishermen's cottages of the Western Highlands a century ago, are surrounded by gardens of flowers which were popular in Victorian English gardens. There are plenty of pubs, where English style ale is on tap, and meals which one reads about in novels of English rural life but usually fails to discover. A great saddle of mutton, gooseberry tart and cheese, are typical fare. There is a Scots burr in the chatter of the customers, and the children use Gaelic words to describe their games. A pleasant place in summer time is Stanley. The farmers, who run sheep stations of anything from 40,000 to 100,000 acres, told me that in winter it is not too bad, either. Apart from dental troubles through lack of calcium in the water, the Islanders' health is among the best of any community on earth. Compared with some of the tourist Meccas of the Atlantic, the Falklands are good islands in which to live—as distinct from merely having a holiday.

To the South of the Falklands, forming a loose barrier between the Atlantic and Pacific, lie the least-known islands of the ocean. Classified politically as the Falkland Island Dependencies they stretch outwards from the Antarctic Continent on each side of the Antarctic Circle. The South Orkneys, South Shetlands, and Graham Land are almost entirely destitute of plant life and most of them are nearly completely covered with snow and ice. The whisper of uranium has been heard about them. There does not seem to be much else. But as naval bases they are of importance, and they have for years provided whaling bases for British and Norwegian companies. This activity has in recent years lessened because of the increasing use of floating whaling factories.

No area of the world has been the zone of such careful and unremitting exploration during this century as the Falkland Island Dependencies. The sporadic reports in the press give only a glimpse of the work that has gone on almost without cessation since 1926.

At the height of the war the British Government launched a new survey programme. It began in December, 1943, when an expedition left quietly to set up a base at Port Lockroy in the Palmer Archipelago and at Deception Island in the South Shetlands. In command was a man who won fame as a boy. He was Lieut.-Commander J. W. S. Marr—Scout Marr of the Shackleton Expedition of 1922.

After the war the Colonial Office took over control of the project, and it developed into the greatest combined Commonwealth enterprise of its kind. The ships came from Britain and Newfoundland. The staffs of the shore stations included men from the United Kingdom, Australia, Canada, New Zealand, South Africa, Rhodesia and the Falkland Islands. These men have added a huge area to the useful lands of the Commonwealth. Weather stations are for the first time investigating the movement of Antarctic depressions and improving the forecasting service for all countries South of the Equator. Knowledge of health requirements for men living for prolonged periods in low temperatures has been gained. Extensive geological and biological collections are helping to unravel the hitherto-unknown story of life origins in South America, Australia and New Zealand. The bases, each with a post office, have made it possible for men to live and thrive farther South than human beings have ever lived before. These bases are now numerous, and have given names to areas which are blank on many maps of recent printing. The most recently established are at Cape Geddes in Laurie Island (South Orkneys), Admiralty Bay (Graham Land) Stenington Island, and Neny Fjord (Graham Land). They are outposts of the Commonwealth where the Atlantic solidifies with the land. For the men who are exploring them they are as romantic and as full of promise as any of the islands which beckoned the fifteenth-century explorers of the ocean.

CHAPTER XIV

OCEAN UNCONQUERABLE

THIRTY-THREE million square miles of water to challenge the spirit of man! His ships churn its surface and throb in its depths. His cables dangle across its trenches and destroy its time barrier. Radio signals span it, and electronic impulses echo from its bed. Its air is the tenuous roadway for his aircraft, and its life is taken as a symbolic, tiny sacrifice to his puny power and appetite. But the Atlantic remains, and will remain, a challenge which cannot be wholly met, a mystery which will never be entirely solved.

There are travellers who glance at her wastes and turn bored from the scene because they say they know the Atlantic well. Half a dozen crossings will not make this sea a familiar friend. The eye scannning the circular horizon can see the edges of an ocean path, maybe a dozen miles wide. The hundred square miles of the disc of which his ship is the centre is a dot hardly visible to the eye on a paper atlas. Nor can he know the extent of this sea by glancing from his magazine through the porthole of an airliner. Vast indeed is the sea surface beneath him. If he flies by stratosphere plane at 30,000 ft. he should be able to gaze over an arc with a radius of some 240 miles. With imagination to assimilate the scene, and the persistency to continue watching for the seven hours or so of his sea flight he might well gain some conception of the remote Northern section of an ocean which stretches for 9,000 miles to the South and is as much as 5,000 miles broad.

Even with these qualities of vision and unwinking patience it is unlikely that the real majesty of the ocean will be revealed. Clouds conceal it. Rare indeed is the air traveller who, like a war-time pilot who saw another aircraft in the vault of heaven 35,000 ft. above the earth and 90 miles to the North of his own machine, finds the air ready to reveal the dimensions of her sister element the sea.

There is one place for the energetic seeker of the fascination the Atlantic has through history imposed on man: the 12,200-ft. peak of Teneriffe. From here, in the fairly frequent periods of perfect atmospheric conditions, the Atlantic is visible in all its fantastic size, minute a portion of its actual area though the scene may be. Here the curve of the earth on the horizon is registered by the eye through refraction. The midget on this peak can look at the sea a long way below his feet. He can wonder what lies beyond that hazy line where sea meets sky 150 miles away. As he gazes he will, with people who gazed West before Columbus sailed, imagine that the New World looms there with only slightly less clarity than the purplish coast of Africa behind him. A few fishing smacks, a seaplane bringing sun worshippers from Northern lands, a splurge of white around the black dot of an ocean tramp—those will be the only clues to a twentieth-century scene instead of a day in far pre-history.

There is no time sense in this ocean. Underwater radar, invader of the Atlantic in the last split second, probes and rebounds from life which has been unchanged since the first few hours of the earth's day. If the North Atlantic is invaded by every device that the ingenuity of man can contrive its waters can continue undisturbed to nurture life which it befriended three hundred million years ago. The hag fish, snake-shaped, jawless, its unseeing eye dormant above a single nostril, writhes and sinks, living as it has done since it was the early ancestor of all the living things that walk and swim and fly on the face of the planet World. Time from dawn to high noon is spanned in these twilight depths. Dawn's scene will still be there when Sunset comes.

Changeless by the standards of man, the Atlantic gives signs of constant changes awful in their power. If the theory of the drifting continents is correct then the continents must be drifting still, though careful observations made by Danish expeditions in Greenland before the war failed to yield any evidence that this land mass was moving in any direction. Earlier observations, made without the help of radio signals to confirm the exact time, suggested that Greenland was shifting West at the tremendous rate of 20 metres a year.

If the pressure of the water has temporarily ceased to squeeze the lighter dry land sideways it is certainly causing undulations of the earth-surface. Geology indicates that the level of land and sea in relation to one another is constantly altering. The British Isles, for example, tend to tip downwards on the Eastern side. Sea level is more difficult to calculate because a decision has to be made on high water, low water or the mean of both. Any of these figures depends on tidal factors, themselves subject to both predictable rhythm and unpredictable change. Great Britain's height above sea level was calculated on the mean sea level of the water in Victoria Dock, Liverpool, taken in the spring of 1844. More accurate data were required, and in 1911 new observations were made, the station recording the Atlantic level being at Newlyn, Cornwall. The ocean tides have been recorded there every hour: they show that the mean sea level of the Eastern Atlantic is rising very slightly. On the other side of the ocean tidal observations at Fort Hamilton, New York State, showed that no progressive change in the sea or land levels had occurred between 1895 and 1930. The changes there were irregular as well as periodic. Astronomical and meteorological conditions caused the level to fluctuate, but the mean had remained the same for a brief thirty-five years. But will the armistice between sea and land be broken to-morrow?

At each end of the Atlantic stand the reservoirs which have in the past and could again pour a second flood across the world. The sea is merely a dampening of the globe as thick as the condensation on a football kicked through dew-laden grass. The land emerges in another tiny layer above this to make islands of dryness on the football's moisture-laden surface. The highest nodule (Everest) is twelve miles above the deepest abyss of the Philippine trench of the Pacific. The average height of land is less than half a mile, less than a fifth of the average depth of the oceans. Such is the enticing victim for the greedy sea.

Greenland sleeps under an ice blanket which has a thickness of 550 yards at the edge and 3,000 yards at the centre. The rock underneath is being crumbled by a mass of ice which Wegener calculated amounted to a million cubic miles. This ice, vaster in bulk than all the land of Europe, could pour the equivalent of several seas into the Atlantic. Conditions to cause its melting would also transform the even larger ice cap of the Antarctic, but without it Greenland's molten ice would raise the level of the seas of the world by twenty-five feet. Before the water found its new level the coastal civilizations as we know them would have been inundated. After it had subsided all the towns which are great Atlantic seaports would be useless, their harbours and wharves far below the surface.

And if the Atlantic waters do not warm those ice caps the ocean may well bring disaster by allowing cold to conquer. Some pessimistic geologists suggest that the earth is getting base-heavy. In the North the warmth is creeping upwards, melting the barrier between sea and Pole. In the South there are no warming streams to send their myriads of globules against the ice wall. Day by day, century by century, the ice has been piling up, and any minute now, say these scientific harbingers of cataclysm, the earth will wobble. She will find a new axis and then spin once more on her serene annual journey. But in that search for a new axis the seas will swirl in their anger and uneasiness to invade new areas. Mountains of ice crashing into the sea will send out great waves and raise the sea level by hundreds of feet for a brief period even before the melting starts. Warm and fertile zones will freeze instantly; just as once before the browsing mammoths of balmy and fertile Siberia and Alaska were engulfed by a great cold which solidified them as they stood, so will man's puny Atlantic-bordering civilization be partly drowned, partly refrigerated. . . .

Shifting Poles, shifting continents, shifting ocean—they might cause Cataclysm but not Finality. The death throes of the world may find the Atlantic mistress of the earth as it was in the Beginning. Comet or bursting sun, before they set the world afire, would scorch the lands and melt the snows, sending life to the succour of the sea's fast-vanishing coolness. The waters that battered against the heat enemy would themselves devour its suppliants, the plants, the animals, the birds, Man.

Should fire fail to do battle with the sea and feed it with its molten ice then the remorseless power of water itself will inevitably conquer the world. Its restlessness can smash away the land's bastions, but it has other insidious powers.

Inevitably, should no other disaster encompass the world, water must win. The rivers pour the fabric of the land into the sea. The waves gnaw at its edge. Wind carries it in dust to fall on the sea bosom. Animal and plant feed on the earth and transform it so it can be carried away by water. The levelling began as soon as the land was heaved upwards from chaos. It must end with an ocean spreading over all—a mere two or three inches over a landless globe.

Ten square miles it has been estimated, are conquered every year. A billion years have given ten billion square miles to the sea, and the land has retaliated by taking nearly as much back to itself. But the sea is patient. In a billion years it can win inevitable victory. The loss to the land in this battle is always greater than the gain.

Sun, wind, raincloud, and cold are allies of the sea. The sun heats the surface of the rocks and cracks them, dries the soil so that the wind can bear it up and drop it over the ocean. The clouds pour the rain lent by the sea on the lands, repaying the loan with the water and the soil, gravel and sand day after day, aeon after aeon.

One day the seas will conquer the last square mile of dry land in the world. The Atlantic, mother of waters, will reign supreme, Sea of Tethys, Sea First and Sea Last, existing while earth time endures.

"And I saw a new heaven and a new earth; for the first heaven and the first earth were passed away; and there was no more sea." Heaven and earth shall go, revealed St. John from his tortured prophetic soul, before the sea. It came from the firmament riding on the clouds of gas. Men called it the Atlantic and tried to conquer it. It will ride away into space as it came. Unconquered.

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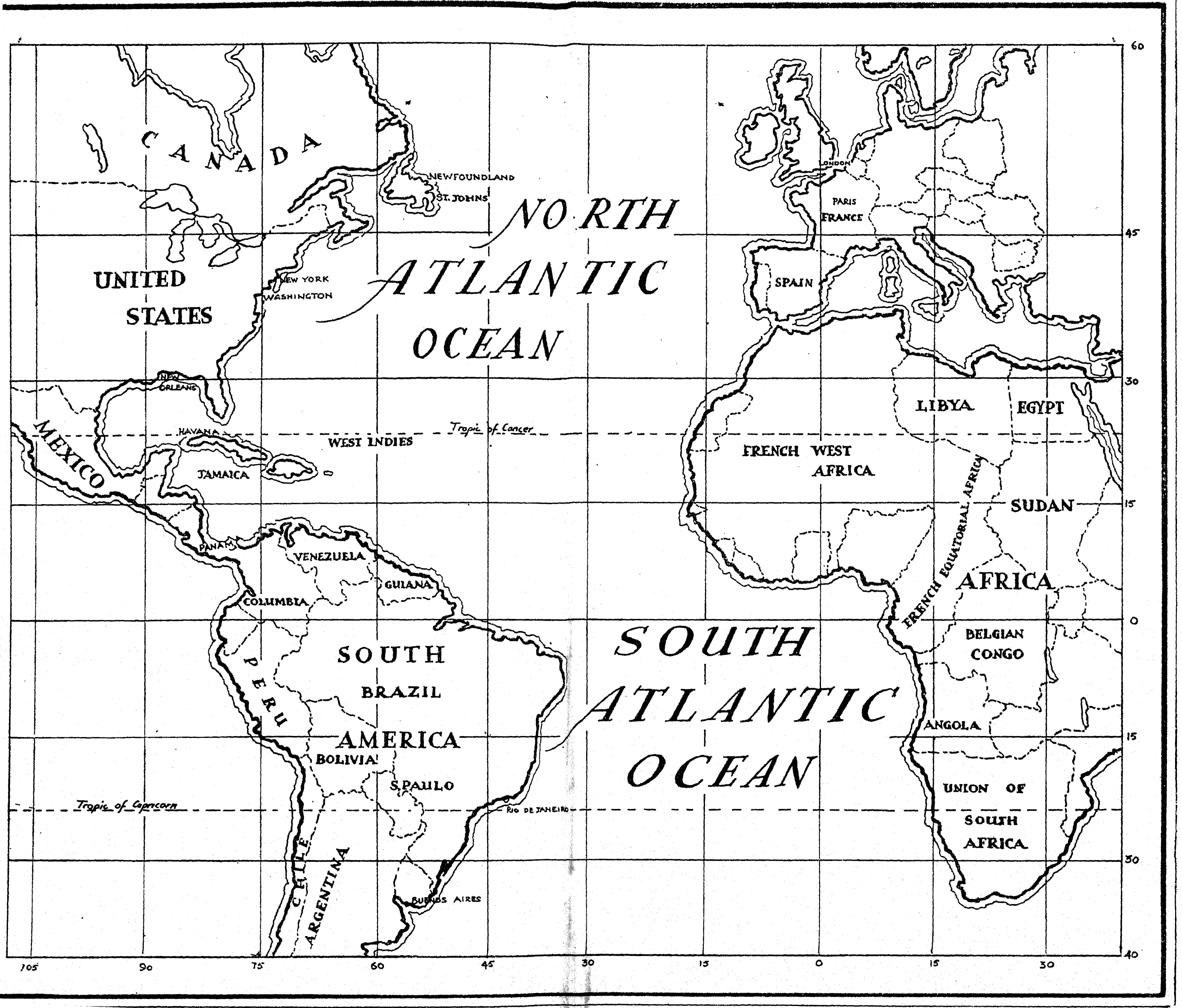
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